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JOURNAL  
OF THE  
ASIATIC SOCIETY OF BENGAL,

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VOL. XXVIII.

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“It will flourish, if naturalists, chemists, antiquaries, philologers, and men of science in different parts of *Asia*, will commit their observations to writing, and send them to the Asiatic Society at Calcutta. It will languish if such communications shall be long intermitted; and it will die away, if they shall entirely cease.”—

SIR WM. JONES.

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1859.





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JOURNAL  
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No. III. 1859.  
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*Notes and Queries suggested by a Visit to Orissa in January 1859.—*  
*By the Rev. J. LONG.*

1. *Orissa now and formerly.* Orissa is so cut off from other parts of India through the want of easy and cheap communication that little is known about it,—though whether we consider its famous temple, the stronghold of Hinduism, or its ancient history when Buddhism was in the ascendant,—there is very much to interest the philanthropist and the antiquarian. The paucity of ruins in Orissa is no criterion of its past condition, as for example,—the Nepal Terai, now a deadly jungle, was 3000 years ago the abode of a powerful race, and Janak, Ram's father-in-law, held his Court there;—the Sunderbuns a few centuries ago could boast of a flourishing population and of five cities,—and in Purulia, now an *Ultima Thule*, the ruins of a large city may be found. Though in Orissa there are few monuments of antiquity to throw light on the past yet we can grope in MSS., traditions and customs.

2. *Inference as to its future prospects.* There is a cry raised now that investigations into the past condition of India are of no practical use, and that Indian experience is of no value,—but the fact is overlooked that the past is mother of the future, and that the former social condition of a people has an important bearing on prospective measures for their enlightenment. Antiquarian enquiries in Nepal, Ceylon and China show that Buddhism, so noted in its regard for enlightening the masses and opposing caste,

was for ages predominant all through Orissa both among rulers and people,—though Orissa be *now* the garden of Hinduism and Jagannath its Jerusalem. Even Jagannath itself stands on the site of a Buddhist temple and contained the celebrated tooth of Buddha, which was kept there till the 4th century, A. D., when it was carried for a short period to Patna, the ancient Palibothra, then the capital of North India, it was soon after brought back to Puri, but on an invasion of the country, it was conveyed A. D. 311 by a king's daughter concealed in her hair to Ceylon, which was then becoming a place of refuge to the Buddhists from the Brahmans' rage. Priusep, Lassen, Burnouf have established from the evidence of MSS., Inscriptions on pillars, rocks, &c., that Buddhism was the state religion of India from the days of Asoka 3 centuries B. C. to the 4th century A. D., while the Chinese travellers Fa Hian and Hiuan Tshang give us information of its prevalence up to the 7th century A. D.

3. *My enquiries in Orissa.* I spent ten days at Puri and subsequently visited Bhubanesar, Kattak, the rock cut caves of Kandigiri, the country on the borders of the Chilka lake; in all those places I sought by procuring Sanskrit or Uriya MSS., by conversation with intelligent pandits, natives and Europeans to ascertain the local traditions and to gain any information which would prove a clue to the past history of Orissa. Sterling's Orissa alas is the only work written by an European that throws light on former days, with the exception of Major Kittoe's account of his visits to the Cave temples at Bhubanesar. Subsequent books indicate that the writers knew little of the people below the surface and are mere plagiarisms from Sterling's work.

4. *Myths are sometimes truths in symbol.* Lassen in his *Indische Alterthumskunde* has shown that the Epic poems of the Ramayan and Mahabharat, though myths, may yield their quota of geographic and historic truth to the careful investigator. Wilson has made the Vishnu Purana subserve the same object, and we need for India in the present day a Walter Scott who will render old legends, popular songs, and mythic works conducive to the cause of historic research.

5. *MSS. relating to Orissa.* In the following MSS. procurable in Orissa, are scattered data and hints, which may be of value to one



investigating the former social and religious condition of the people of Orissa.

UTKAL KHAND MS. in Sanskrit.

A section of the Skandha Purana, detailing the places of pilgrimage in Orissa from Jagannath to the Vaítariní river and the origin of the worship at Jagannath. It follows the same plan as the *Kási Khand*, which gives similar information regarding Benares.

KHETRA MAHATMEA MS. in Sanskrit.

A part of the Skandha Purana, stating various points about the sanctity of the places at Bhubanesar—the ancient Benares of Orissa before Jagannath rose into popular estimation. I found this MS. held in great esteem by the pandits at Bhubanesar.

KAPILA SANHITÁ MS. in Sanskrit.

A collection from various Puranas, giving the legends relating to Jagannath, Kanárák, Bhubanesar, Jájipur.

ITIHÁS SAMUCHAY MS. in Sanskrit.

An account of Rajas and temples in various parts of India.

MANDALI PANGI MS. in Uriya.

Records of the Jagannath temple, begun in the 13th century, by Churang Deva, the first of the Ganga Vansa line of Rajas. This MS. is referred to in the Courts as an authority to decide disputes among the officers of Jagannath's temple. It gives an account of Kála Páhár the great Moslem iconoclast of Orissa.

GAJAPATI VANSÁBALI MS. in Uriya.

A Genealogical account of the Orissa rajas of the Gajapati line, with the various temple officers at Jagannath.

RÁJ CHARITA MS. in Uriya.

History of the Kings of Orissa of the Kesari race.

KÁNJI KAVIRI PUTHI MS. in Uriya.

An Epic poem celebrating the conquest of Conjeveram.

EKÁMRA MAHATMEA MS. ou Bhubanesar.

SIVA PURANA MS. in Sanskrit.

Gives information about Bhubanesar.

JAGANMOHANA MS. in Uriya.

Description of Jagannath and its festivals.

*Use might be made of the MSS. referred to by Wilford such as—*

A BENGALI PANDIT'S COMMENTARY ON THE GEOGRAPHY OF THE MAHABHÁRAT.

VIKRAMA SÁGAR MS.

DESA MÁLÁ AND KHSHETRA SAMÁSA OF THE PURANAS.

BHUVANA KOSA OF THE BHAVISHYEA PURANA.

KRITADHÁRÁVALI MS.

TÁRÁ TANTRA MS.

It is a subject of regret that Lassen in his great work the *Alterthumskunde* had not these MSS.

We want some one to do for Orissa, what Major Troyer in Paris has performed for Kashmir in his *Rájatarangíní*, viz. to give us a translation of the pith of the above MSS. with notes and preliminary dissertations. As the valley of Kashmir, owing to the discovery of a MS. 40 years ago, has afforded so rich a field of investigation into the social and religious condition of its people in days of yore—surely Orissa is not barren of incidents on the same subject?

6. *Life of Sangkar Acharyea of use for Orissa.* In connection with the history of Orissa a life of *Sangkar A'charyea* compiled from such MSS. as the SANGKAR KATHÁ, SANGKAR CHARITRA, KERALUTPATI, SANGKAR BIJAY AND SARVA DARSHANA SANGRAHA is desirable. Light would thus be thrown on the state of Orissa when the dogmas of Sangkar gained the ascendancy over the Vaishnav and Buddhist systems. Though Sangkar himself was so liberal as to be a follower both of the Vedantic and Tantric systems, yet to the Buddhists he was the *malleus hereticorum*, and like Charlemagne he resorted to the sword when the process of conviction was too slow. Professor Wilson in his "Sects of the Hindus" has made much use of these MSS., but he admits that a *further analysis* of them would be of great value in giving the state of Hinduism in the 9th century, A. D. He wrote his account 30 years ago, but since that period immense progress has been made with reference to oriental research in France, Germany, Russia and England.

7. *Chaitanyea.* The effect of Chaitanyea the great Vaishnav's preaching in Orissa in the 16th century would deserve investigation. His doctrines gained rapid ascendancy when Pratáp Rudra

Deva, one of the Gajapati kings who ruled from A. D. 1503 renounced the Jain doctrines and adopted those of Chaitanyea. The following printed books afford some information on the subject.

CHAITANYEA CHANDRODAY, CHAITANYEA BHÁGAVAT, CHAITANYEA CHARITRA.—But there are many MSS. hoarded up by the Gosains as carefully as the Jains hoard up theirs—*these ought to be procured.*

8. *Jain MSS. desirable.* The Jains have very valuable libraries in Rajputana which, judging from what China has yielded, may also remove some of the veil which hangs over Orissa. I was two years ago in a Jain house in Benares where there was a large collection of Jain MSS. Dr. Stevenson has made use of Jain MSS. to give information regarding certain places in the Bombay Presidency. These MSS. might afford a clue to the connection of the Jains or Buddhists in Central India with those in Orissa. A Buddhist inscription has been found in a Buddhist temple in Nagpur of the date 657 A. D., and it was not until the 13th century the Jains were expelled from the Pandyan country.

Analyses of these works with notes on the plan that Hodgson and Ksoma de Koros have adopted, would be of great use. The Asiatic Society might publish some in their *Bibliotheca Indica*, which hitherto has contained few works throwing light on the *social condition and manners of the people of India.*

9. *Romanising in Orissa.* All the Sanskrit MS. used in Orissa are written in the Uriya and not in the Nagari character, though the latter is the *sacred character* of India and hence called the *Deva Nagari* or divine character, but the *Brahmans* will not accept an universal character—nationality prevails over theory—and yet there are men who dream of abolishing all the Indian alphabets and substituting the English alphabet for them!

10. *Uriya language.* The Uriya language has been very little cultivated: the Brahman scholars in Orissa as well as in Bengal despised the Vernacular. The Bhagavat Gita however was translated from the Sanskrit into Uriya three centuries ago; among original works are the *Rasa Kalol* on Krishna, the *Vaidhivilás* about Ram, the *Labaneatatra*, a tale, the *Mukunda Málá*, *Járatí bhakti* a

Vaishnav work, *Rasamanjari* and *Rasapanchak* with several *Mahâtmeas* or temple legends.

11. *Fractions of Languages.* Valuable as is the Uriya language for imparting to the common people an *elementary* education, it is not likely to be much cultivated: the people of Orissa are too few to render it probable that the expenses of creating a literature can be borne by them or by Government, it will be much easier for Uriyas who wish to acquire knowledge to gain it through the Bengali, a kindred language, which is rapidly developing itself. The Bengali is already rapidly encroaching on the Uriya. The cultivation of the smaller dialects or "fractions of languages" in India promotes division and isolation, even natives when left to themselves prefer the cultivation of a more refined Indian language—thus in the Sonthal districts Hindi is being studied, as also in Chota Nagpur, while among the Karens of Burma the Burmese language must be ultimately the vehicle for communicating to them literature and science. Both in Assam and Orissa Government teaches Bengali to the highest classes in the schools.

12. *Pali elements in Uriya.* When the Buddhists held sway in Orissa, Pali was probably in use, it would be interesting to trace out what Pali elements are in the Uriya language and also if there be any Telegu elements, as Caldwell in his "Dravidian languages" states that "Telegu was formerly spoken as far north as the mouths of the Ganges." We very much need a Comparative Grammar of the Bengali, Hindi, Mahratta and Uriya languages, pointing out their Scythian, Sanskrit and Pali elements and their various dialectical changes.

13. *Orissa and Bengal little connected.* Orissa seems in very early times to have had little direct connection with Bengal. Though Adisur sent Brahmans from Kanauj to Bengal, because probably of the influence of Buddhism there, the Pal kings of Gaur being Buddhists—and Sakhya Muni the last great prophet of Buddhism had died in Assam, there is no mention of Orissa in connection with them. Even now there is not a single Bengali Mahant at Jagannath, though there are about 120 of that class, some of whom realise half a lac a year income. Hence customs differ much in Bengal and Orissa, the following prevail or prevailed in Orissa as distinct from Bengal.

14. *Peculiar Customs in Orissa.* If a brother dies childless his brother is to marry the widow in order to raise up seed to the deceased—in satis women were burned in a pit—the Brahmans eat no fish—the impurity of a Sudra after the death of a relative lasts only 10 days, in Bengal 30 days.—Marriages take place at a riper age.—Barbers and cultivators eat in the houses of the bearer caste—there are no Brahmini bulls revered—at shrads only pinda or vegetables are offered.—Raghu Nandau's smritis have no authority—women are kept more secluded.—Brahmans eat onions, wear no shoes,—the women tattoo their forehead and arms,—many Sudras know a little Sanskrit,—the Brahmans study the Yajur Veda, in Bengal the Sama Veda. It would be interesting to enquire into the special causes of the diversity of some of these customs.

15. *Was Hinduism introduced into Orissa in the days of Ram Chandra?*

The Ramayan mentions Ram's sojourn during part of his exile in the Dandaka forest and near the Godavery, places to the South West of Orissa; while tradition connects the rocks of Khandigiri with Hanumau and states that Kapila Muui resided in their neighbourhood. The 4th section of the Raghu Vansa gives the march of one of the Hindu armies of Ram's period to the borders of the Bay of Bengal which must have been near the coast of Orissa. A king of Kashmir Lalitadyea is stated in the *Rajtarangini* to have marched an army about Ram's era to the South of India. The progress of the Arian race having been a gradual one South, Kashmir, Hastinapur, Oude, Benares, Palibothra, Gaur, becoming successive centres, a place like Orissa could hardly have been overlooked as affording facilities for embarking by sea to the South. In Manu's time Brahmans were sea-captains and traded with foreign countries, while the chief seats of religious worship having been on promontories of the sea such as Somnath and Dwarka in Scinde, Ramiseran and Mavalipur in South India, Sagur Island in Bengal, Jagaunath and Kamarak in Orissa, would show that the ocean was used in early times for pilgrimage and religious propagandism.

16. *When was Buddhism introduced into Orissa?* Probably in the days of king Asoka about 250 B. C. as appears from the Dhauli inscription—he sent Buddhist missionaries in all directions to the



slopes of the Himmalayas, and the banks of the Indus, as well as his own brother as a Buddhist missionary to Ceylon; subsequently a close religious intercourse between Ceylon and Palibothra, (Patna) was maintained by sea. We have in Fa Hian's travels (3rd century A. D.) an account of vessels sailing between Tamluk to the North of Orissa and China, while Buddhist remains are found on the Madras coast at the Kistna and Mahavellepuram. Want of roads were no obstacle to Buddhist itinerants as the Rájtarangini states of them.

*Bandvanám prabajyorjit tejasan.*

Orissa would form a central point for pilgrims travelling between Bahar, the fount of Indian Buddhism and Ceylon, pilgrims landing from Ceylon at Jagannath would see Buddha's tooth there, then proceed to Bhubaneswar the Buddhist Benares of that day, thence to Vishnupur a mighty place at that period, and so on to Paras-nath, or they might have proceeded to Tamluk or Tamralipti\* and have gone up the Ganges.

17. *Orissa nationality.* While in Bengal we have never had any traces of independence and nationality, in Orissa it is different. The Orissa rulers three centuries ago extended their sway as far North as Tribeni on the Hughly, the Southern Prayág of the Hindus, and as far South as the Godaveri, while the Orissa Rájá opposed in battle the mighty Krishna Roy, king of Vijayanagar.† The Orissa peasants are an honester and braver race than the Bengali, happily for them they are not ground down by zemindars as the Bengal peasants are under the permanent settlement, the ze-

\* Tamluk is described by Huian Thsang in the 7th century as a place where great traffic was carried on by land and by water. In the 3rd century Fa Hian found 1000 monks there and a tower erected by Asoka, while before the Christian era, according to Klaproth, Dharmasokar, king of all Jambudpi, sent an Embassy to Ceylon which embarked at Tamluk.

† We have an analogous instance of the power of nations bordering on Bengal in the case of the Asamese who in the days of Aurangjib destroyed the army sent under Mir Jumla to conquer their country. The Tripura men have been noted for their bravery and even the women rushed to the battle field and some of them, as the Tripura MSS. show, like the Mahrattas led armies.

mindar cannot oust them at will. There is a report of Mr. Forster's on this subject which well deserves reprinting.

18. *Hill people of Orissa.* The hill population of Orissa is very different from that of the plains, they belong to the aboriginal tribes but little is known of their original languages and traditions. Their Rájás were the Rob Roys of their districts, the oldest family is that of the Rája of Kurdah. Six centuries ago they came from the North West of India. It would be worth enquiry *what Scythian or Celtic remains are to be found in those hills*, any structures in the form of cairns, cromlechs, burrows. Dr. Wise in his paper in the Transactions of the Royal Society of Edinburgh, Vol. XXI. Pt. II. p. 255 shews the general identity in idea and design of the Celtic structures of Europe and the Buddhist relics of India; Professor Westergaard has written on a similar subject with regard to Iceland.

19. *Jagannath temple, origin of its peculiarities.* The interior of the temple of Jagannath cannot be seen by Europeans, I have found the natives of Orissa more jealous about allowing Europeans into their temples than the natives of Benares,—is it that never having felt much of the rough hand of the Moslem dealing unscrupulously with their prejudices, they have therefore become so exclusive? The interior of the temple is said to be a regular pantheon having temples to Hanuman, Vibhishan, Suryea, Indra, Nanda, Kuvera, Sitala.\* There are various points besides this in connection with Jagannath, which seem to indicate that it was an eclectic system selecting from different sects and incorporating all; thus though Jagannath gives much ascendancy to the Vaishnavs, yet the Pandabs at Jagannath all belong to the Shákta sect of the Sivites, they do not, however, practice those horribly obscene rites

\* It would be worth enquiry as to when the worship of Sitala, the goddess of the small-pox, arose. Dr. Wise of Dacca collected much information on this subject which he has taken to Europe with him. Near Calcutta there is a temple to the goddess of cholera erected forty years ago, when this epidemic arose in India. It would be interesting to know also when the worship of the *grám devatá* or village gods arose in Bengal, the bráhmans do not admit their pedigree; to the South of Calcutta a god called Dakshin Roy is worshipped as the protector of the ryots against floods and tigers. Is this a god of the old aborigines of Bengal?

observed by the same sect at Santipore. It seems also to retain some traces of the old Buddhistic system, thus the Rath Játrá procession is said to have been derived from the Buddhist procession with the birth of Jagannáth, there is no procession like this connected with other gods of Hinduism. The practice also peculiar to Jagannath of all, excepting the lowest classes, eating together, seems a remnant of that Buddhistic principle which had for its system of action long before the French Revolution, "liberté, égalité, fraternité." The architecture of the car of Jagannath is like that of certain Buddhist religious buildings, the temple of Jagannath similar to the Gaya temple corresponds in its architectural shape with that of the Buddhist temple at Patan in Nepal, the bráhmans call the temple of Maha Buddha or Gaya, Jagannath. The bráhmans found the easiest way to obliterate the remembrance of Buddhist idols was to adopt them and give them bráhminical names.

20. *Bhubaneswar and its ruins.* Next to Jagannath the place of greatest interest in Orissa is the city of Bhubanesar, the approach to it is most striking. The traveller emerges all at once from paddy-fields into the midst of a deserted city, another Palmyra, ruins of temples all around, but no worshippers, reminding one strongly of the ruins of Toglökabad near Delhi or of Sarnath the old site of Buddhist Benares. When Bhubanesar with its 999 Siva temples was founded, Buddhism was waning from Orissa and the Sivite system was gaining the ascendancy, not merely owing to persecution but also to a reaction from the strict and ascetic system of Buddhism, like what took place in England from the prudery under Cromwell to the licentious days of Charles the 2nd. Buddhism itself was altering too, and after introducing a system of hero-worship, its followers ended in the worship of female deities, and finally many adopted a system half Sivite, half Buddhist. What a contrast between the worship of the original Buddhists in Orissa and the later period when they adopted the Tantrik system. The existence of this system in Nepal among the Buddhists was discovered with great difficulty by Hodgson, and as it spread to Thibet in the 11th century and was powerful in India according to Ksoma de Koros in the 9th century, its origin was probably coeval with the erection of the Sivite temples at Bhubanesar.



21. *Was Bhubanesar originally Buddhist?* It is singular that no civil buildings remain in Bhubanesar with the exception of some ruins pointed out as the site of the palace of the Kesari rajas, who are said to have founded Bhubanesar A. D. 620, and to have made it the seat of their government. *Is it not probable that the existing Sivite temples were made out of Buddhist ones?* In Europe at the Reformation, Roman Catholic Churches were turned to Protestant uses. The Brahmans of India adopted the same plan with the buildings of their Buddhist rivals, the Musalmans did the same with Jain buildings. *Is it not probable there was a Buddhist Bhubanesar?* It lay on the high road from Puri to Magadh, and as at Delhi the ground has been the site of three distinct capitals of three different dynasties, so why may Bhubanesar not have been Hindu and Buddhist at successive periods?

22. *Rock-cut Caves of Khandigiri.* Six miles from Bhubanesar are the Buddhist CAVES OF KHANDIGIRI among the oldest in India, executed probably about two centuries B. C., half a century after Buddhism gained a footing in Orissa. The caves of Ajunta were not excavated till about A. D. 1100, and yet it is singular that nine-tenths of the fifty different groups of Buddhist caves in India should be in the Bombay Presidency, so far away from Magadh the seat of Indian Buddhism. The Khandigiri caves are adapted either for solitary ascetics or for monks living in community. Why is the verandah of one of them carved into a form to represent the tiger's head? The Pali inscriptions over some of the caves which have stood the storms and changes of twenty centuries, afford a strong contrast with the ephemeral paper memorials of the Marhattas and Moslems in Orissa. Jain merchants who occasionally come on pilgrimage here have erected a Jain temple on the top of one of those cave hills, behind the temple they heap up memorial stones like the cairns of the Celts. No buildings are near those caves, the Buddhists always preferring their fraternities to be located away from the din and noise of cities.

23. *Kanarak temple.* As a monumental link between the old Vedic worship and Buddhism we have the temple of the Sun or KANÁRAK,—there is another temple to the Sun at Ajmir—landmarks on the sand of time to show the passing away of false sys-

tems—it is singular that in Orissa, whatever the deity be that the temple is dedicated to, the figures of the nine planets occupy a position over the doorway. At the time when this temple was erected—about the 12th century,—the worship of the Sun was still recognised, the Sauras or Sun worshippers are frequently mentioned in the life of Sangkara Acharya about the 10th century. The *agni-hotra* or sacrifice to fire was performed in Bengal at the close of last century by Rajakrishna Ray of Nuddea; he is said to have been the last person in Bengal who kept a fire perpetually burning, the relics of a worship once common to the highlands of Persia and the plains of India. This temple of the Sun now presents a complete image of desolation, tens of thousands of bats occupy the interior of the temple and a bear has taken up its abode amid the ruins, while around is a waste of sand relieved occasionally by a beautiful convolvulus or the spike grass which vegetates so easily in the sand.

The temple, however, in its obscene sculpture, shews what influence the Tantrik system had at that time gained in Orissa. It was the time when Sivism had won its ascendancy by fire and sword; the temple of Jagannath dates from this same period as do all the great Sivite temples in South India. How was it the sculpture of this temple escaped the iconoclast hand of Kálá Páhár? A stone which formerly topped the doorway is 20 feet long by  $4\frac{1}{4}$  square, its weight is 10 tons, the nine planets are beautifully sculptured on it, near it lies a bar of iron 20 feet long by 10 inches square weighing  $1\frac{1}{2}$  tons, close to it are three figures in stone of lions rampant on the elephant  $6\frac{1}{2}$  feet high by 6 feet long.\* The immense size of the stones and beauty of the sculpture shew that the mechanical arts were in a forward state eight centuries ago. Those enormous stones were brought from

\* At the time of James Prinsep, the Asiatic Society applied to the Government for permission to remove some of the sculptures to the Asiatic Society's Museum. No answer was sent, but the present Commissioner G. Cockburn, Esq. is quite willing to grant it. Time and the influence of vegetation are rapidly undermining a temple. A Surveyor lately proposed the stones should be used up for surveying purposes. A few years ago the Raja of Khurda through mercenary motives destroyed some of the finest parts of the temple.

the Kattak hills, but how were they carried over the sand? Is it not very probable that the sea formerly flowed up to the base of the temple? In Orissa the land has been gaining on the sea all along the coast, and so has the sand; in Puri there are many buildings now buried under the sand, which in the memory of living men were known to have been built above them. The same process which is increasing the Sandheads and filling up the Hooghly river is going on in Orissa. The deposits brought down by the hill streams and large rivers of Orissa must be gradually silting up the coasts.

24. *Cuttack—ancient city of Orissa.* The foundation of CUTTACK is attributed to the 10th century,—is not this the modern city however? Was not ancient Cuttack situated to the North, at a distance from the treacherous Mahanadi river,—immense ruins have been found there, which served to build the Fort of Cuttack and to form the revetment. Probably old Cuttack was the political and commercial capital of Orissa, for which its position at the head of the Delta and on the road to Magadh or Bahar favoured it. Cuttack had until lately a fine monument of antiquity Fort Bárabati, a splendid specimen of an old fortification which contained remains of the Kesari Raja of the 14th century.\* Though Kattak was the capital of the Mahrattas in Orissa, there are no documents available in Orissa to throw light on their career: like the Musalmans in Orissa they seem to have intermeddled very little in internal arrangements of the country, they were men of the sword not of the pen. The Patans, however, have gained such a hold in Orissa that one-tenth of the population is Afghan.

#### *Queries.*

I append a few additional queries or desideranda relating to other points about Orissa.

\* In 1837 by the Magistrate's orders the fort was pulled down and sold to supply metalling for the roads. An ignorant or perverted taste would lead some men to obliterate all recollections of the past. They see not the force of Dr. Johnson's maxim, "Whatever makes the past, the distant, or the future predominate over the present, raises us in the scale of being."

(1) The having the hills explored by a Botanist, who would also ascertain the Uriya names of all plants in Orissa with their signification and their use in medicine.

(2) Information about Orissa in the last century or the century previous as contained in Portuguese, French or Dutch works. Extensive trade was carried on with Balasore by European traders.\* The Portuguese wrote much about India and an examination of the Libraries of Portugal would throw much light on many Indian subjects. The Dutch also have published various works, Linderhouten's Travels deserve examination.

(3) The etymology of the names for Orissa *Utkal* and *Ordesh*?

(4) There are more than 60 *Deva Dâsi* or temple girls connected with the temple of Jagannath,—when did they first form part of the temple establishment and what is the extent of this practice in other parts of India?

(5) Why should the Buddhist system in Orissa have merged into the Siva system instead of into the Vaishnav, the latter being a much more congenial one?

\* We saw in the Balasore burial ground a tomb, with this inscription, "Here lies the body of Avon, late wife of Capt. Francis William who died 1684."

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*Memorandum on the nature and effects of the Flooding of the Indus on 10th August, 1858, as ascertained at Attok and its neighbourhood.—By Capt. W. HENDERSON, Engineers.*

*On the Indus, 7th January, 1859.*

I begin by observing that this is not the first flood of the sort, but that one on a somewhat larger scale, but in other respects very similar, took place in May,\* 1841. I have seen two very brief accounts of this flood, one I think collated by Col. Abbott, the other furnished by Col. Cunningham. I have also collected at Attok and the neighbourhood some information on the effects of this earlier flood; and as the two are very similar and mutually throw light upon one another, I shall have to refer to that of 1841, and so premise this allusion to it.

The first point on which information is called for is the spot where the obstruction took place. This can only be ascertained by sending up an Officer by way of Cashmere. In the meantime I may offer a few observations.

The obstruction of 1841, took place in the upper part of the valley of the Shayok River or northern Indus which joins what is considered as the main Indus at Keris, and I think brings down more water than the other, which from its long and straight course is naturally considered the principal or parent stream. The blocking took place in the part of the Valley where the stream runs at the back of a high range which separates it from the Nubra Valley. I have been over this ground and was struck with the frequency and solidity of the glaciers which occupy almost every valley in the range, with their tributary glens also. The range is granite, and large rough blocks of that rock form an important component of these glaciers.

The first information was received in the neighbourhood of Attok about the middle of July 1858, and of all that I have heard of, that which appeared most worthy of credit was a letter forwarding what purported to be a general warning by the Syuds of Kangra or

\* I have no books to refer to, so that the date is assigned on native evidencce, which is particularly uncertain as regards time.



Kangri. The Attok boatmen declared at once that the warning received in 1841, emanated from the same place; they recognized the style and stated that the same form of adjuration was employed, and that the signatures appended were the same, except that two or three individuals, who might fairly be supposed to have died in the interval, were omitted from the later document. Search was then made in the house of Bulloo, the oldest of the Mullicks of the boatmen, but though it was well known that the paper was preserved there till a year or two ago, the search proved unsuccessful.

There is a village named Kangri marked in the Surveyor General's map of the Punjab and adjoining countries, and I believe this is the place alluded to, it is at no great distance from the Nubra and Shayok Valleys, and if the fact be that both papers issued from it, a fair inference is that in both cases the obstruction was at no great distance from its site; for in these valleys such news would not travel far except it were down the course of the river. We know that the damming of 1841, took place within two or three days' march of the village, and, till better evidence be obtained, can but conjecture that this also occurred in the Shayok or in the Nubra valley. Both are well adapted for the purpose, being wide with strangulations at intervals, having comparatively a small slope of bed and being supplied from large glaciers above with considerable and unfailing streams of water. For though the main fall of the Indus-bed takes place between Kangri and Attok, yet the general character of all the streams I have observed in the Himalayas is to fall in steps, a comparatively sluggish portion intervening below the first rush of the minor tributaries, to be succeeded by the main stream making its way in a series of rapids for two or three hundred miles. Both the Nubra and the upper Shayok are thus comparatively slow flowing, and in the former especially there are numerous quicksands.

I have two or three times crossed the Shayok, and found it in the summer time a stream of considerable size.

On the other hand, and contradictory to the above, all Major Becher's information pointed to the river of Gilgit, and that pretty consistently; but as this cannot be reconciled to the facts I have noted, as I understand them, I am inclined, till more evidence is obtained, to discredit it. I do not find in the map alluded to glaciers

marked so far west as the River of Gilgit\* nor are the mountains from which it comes so high or so snow-clad as those to the eastward. Indeed I do not know in any part of the Himalayas a region so likely to give birth to catastrophes of the kind as that around the upper part of the Shayok.

The solution of the point is, however, very easy. The whole Indus above the Gilgit river is open to travellers proceeding under the protection of the Maharaja of Cashmere, and any officer starting from that valley and striking the Indus at the foot of the Nunga Purbut, (a route which I recollect an officer of the artillery following in the summer of 1855,) and thence marching upwards, would very soon ascertain positively the exact locality of the obstruction. I should be glad if opportunity offered to proceed thither for the purpose, and regret that when in that country before, I gave less attention to the matter than I should have done had I thought that a flood like that of 1841, could by any chance occur again in any definite number of years.

The second point mooted is the nature of the obstacle. We may pronounce with almost certainty that this was the sudden irruption into a comparatively narrow valley of an immense fragment of a glacier. I have already alluded to the glaciers of the region where I suppose the obstruction to have taken place. I have never seen those of Switzerland, but from what I have heard of them I think that the ones now referred to differ from the character ordinarily assigned to those in Europe, as they certainly greatly excel the latter in magnitude. Yet even in Europe a catastrophe similar to those which have taken place in the Indus valley occurred in that of the Drance in 1818. When crossing from the Nubra to the Shayok valley in August 1855, my companion, who had been in Switzerland, would at first hardly admit that the enormous mass of earth, rock and ice commingled and agglomerated together, with a broad stream of the dirtiest brown water issuing from its foot, and which I pointed out, filling up a tributary valley on our left, was really a glacier; and several hundred miles farther south crossing the great shed between the Lanskar and the Chenab, he pointed out the features he had been accustomed to see, and which we generally find

\* There are however glaciers in every direction and some remarkable ones. EDS.

in description, clear ice of various tints of green, and deep crevasses crossed by snow bridges, and with comparatively clean water running within them. The formation in this case was lime-stone, in the former case granite. With regard to the magnitude of these glaciers I need only say that I travelled nearly a whole day along one which was upwards of fourteen miles in length, varying in width from half a mile to two miles, and several hundred feet in depth.

The glaciers are, it is well known, in constant motion; their progress being subject to the same laws which regulate the motion of rivers. As they advance, their ends melt away and the Moraine gets washed down by the streams that issue from the body of the glaciers. The flow of one glacier measured by Prof. Forbes showed an onward movement of about 450 feet per annum, and it is evident, that where a glacier is cut off above the melting point by a stream running past its end, this motion must make it tend very considerably to encroach into the valley of the stream.

A landslip in one of those huge banks is quite a conceivable contingency, and in no case more likely than when the glacier protrudes with a narrow base and extended top from a small feeding glen coming in, nearly at right angles, into a narrow valley, whose stream crosses the path of the glacier, washing away the narrow foot which the mass behind protrudes, and on which it rests. This foundation being once undermined, the falling forward of a piece of the glacier is the result to be expected; and it is possible that this result often takes place, but that it is not often that circumstances so combine as that the process is delayed till a mass of formidable dimensions topples over.

The remarkable opacity of the water of the Shayok, caused by the glaciers I have described, struck the Messrs. Schlagintweit when carrying on their observations in the neighbourhood, and by adopting a simple test of comparison, they satisfied themselves that in this character it exceeded the water of any stream which they had encountered.

The third point is the "length of time the obstacle remained." On this head the only information to be obtained is native, and that is always vague with regard to matters of time. The warning that came down the river purported to bear date the 2nd July, but



it appears more likely that this date was subsequently inserted in the copy, because it would not allow time for the paper to have travelled down, it having been handed to the Assistant Commissioner Lieut. Shortt, at Shumsabad near Attok, in the middle of the month.

The paper stated that the river had been closed for three months, which would make the beginning of April, and, as the outburst took place apparently on the 8th August, would give for the whole duration a little over four months. But I do not think it likely that so long an interval elapsed—

1st.—Because the period is almost certain to have been exaggerated.

2nd.—Because the thawing powers of the May sun which make that month so peculiarly dangerous from the frequency of avalanches, is likely to have caused the slip.

3rd.—Because from the latter end of May to August those snow-streams are so large that a four months' supply, including that period in the four months, could hardly be supposed to remain stored.

4th.—Because a rather shorter period is assigned, and at a less favorable time of the year, from February to May, for the storage of 1841, which contained apparently about twice the quantity of water, while it is from previous considerations unlikely that any material difference existed between the sites of the two obstructions.

I am inclined to think that the stoppage took place about the middle of May, that it existed for a month before information was sent down below, as till that interval it would hardly be considered a really serious matter; the paper must then have taken about a month to reach Attok, which it did in the middle of July, and after that a delay of nearly another month occurred before the water appeared. The time could not be much shorter than that, though it may have been longer.

The fourth point referred to is the length of time during which a diminution of the stream was perceived below. On this point, I can state that though after the warning rumour came to be pretty generally discussed, people fancied that the stream was peculiarly low, and that it lent corroboration to the report, nothing occurred which would have excited much attention but for the alarm in the country around, and Major Becher assigned as a reason for

regarding the warning with suspicion, that there was nothing unusual to be observed in the conduct of the river.

But the truth is, that there is no reason to think that any of the tributaries, at the point where glaciers abound, is of importance sufficient to affect perceptibly the Indus at Attok; nor indeed is it conceivable that any stream, by the subtradduction of which the Indus could be sensibly diminished, could be dammed up for three months (and I have shewn that the time could not be much shorter); while it is certain that if this were possible, its occurrence would cause a flood far more extensive than that of the 10th August last.

The occurrence of a few cloudy days diminishing the snow melting, or of showery weather in the Hills, cooling the atmosphere there, produces changes in the river, when alternating with bright weather, far more than sufficient to disguise the cutting off of half a dozen of the rivulets which feed the upper waters of the Indus. The river rose last year rather early, compelling me to remove the usual boat-bridge a full month sooner than in 1857, while it afterwards continued for a considerable time at a moderately high level, fluctuating, but not making much progress. We were thus able to establish the bridge in another site, where it continued till 1st June. But all that can be gathered from this is, that along the upper Indus the spring of 1858 was warmer than that of the previous year, but that the genial April was succeeded by cold and cloudy weather. It is indeed a matter of tradition that in 1841 the river became very low previous to the flood, so much so, that men used to cross it by fording above Attok, and when I was collecting information on the subject, they told me that when the bridge of boats was up in February, the river fell in one night several feet, so much in fact that they had to remove boats from either side. I have considerable doubts as to the correctness of either story; and, presuming them both to be amplified from a real paucity of water, have still no reason to think that they had anything to do with the fact of one of the feeders of the river being dammed up some six hundred miles off; besides that, as I before hinted, the period of storage from February to May appears too short. It was also a prominent part of the tradition that the water was much warmer than usual;

as if the snow-supply had been cut off. This I think as improbable as the other circumstances narrated; and to illustrate the probability of their being exaggerated into falsity, I may mention the facts with regard to another phenomenon universally insisted on.—All accounts of the flood of 1841 particularize the wave or wall which swept down the channel of the river, and the noise occasioned by it, which was the first harbinger of the approaching destruction. Some of my informants gravely talked of this wave as 50 or 60 feet high, and of the roar being heard while the water was still a considerable distance behind. In Col. Abbott's notes on the matter, these points are prominent, and it is added that in front of the great wave was a moving mass of carcases, trees, and other matter, swept on by the power of the water.

On this last occasion I was myself on the river in a row boat, which a wave one foot high would doubtless have swamped, but wave there was none, nor noise either, nor any appearance of carcases or anything of the kind. The river commenced rising quickly, but step by step, nor until it had attained a considerable height was there any sign of drift-wood, field-produce, or other floating material.

I made fresh enquiries into the circumstances observed on the previous occasion, and then discovered that there was living till 1857 an old boatman called Lutchoo, who it was well known to all the men had been sitting on his boat in the middle of the bridge at the time the flood occurred, and had managed to float away upon it and ultimately to come safe to land in the mouth of the Herrot. I do not deny that this was a very remarkable escape, nor do I doubt that one dam might give way in a more gradual mode than another, but I feel convinced that a three feet wave would have swamped every one of the old Attok boats, and looking to the ordinary action of running water, am certainly inclined to believe that the flood came down in 1841 much as it did in 1858; and that the wave, the roaring, and the mass of dead bodies, are all fictions together, and in the same way I think that the diminution of water in 1841 has been invented or exaggerated, and that if any such took place it was not owing to the obstruction at all; for on the one hand the stoppage of the main stream of the Indus, at any point where it

deserves such a name, is too wild a supposition to be seriously advanced, and is not the least borne out by the extent and nature of the flood; while, as insisted, the feeders which run through the tract where glaciers are common are too insignificant to affect the Indus at Attok.

The fifth and sixth points enumerated, the height to which the waters rose at the obstruction, and the distance to which the stream was dammed back, are of course far beyond our ken, when the very location of the obstruction itself is indeterminate to a distance of about 300 miles, nor can they be ascertained in any other way than by actual inspection; for though a very rough approximation might be made to the quantity of water discharged, the high valleys vary so much in breadth and in longitudinal slope that the question would still remain undecided; early inspection will settle the point, and that alone will.

The velocity with which the flood water came down was very different at different points of the course, being in the general greatest at the first, and diminishing as the slope of the bed decreased. From Attok to Kallabagh the velocity was fifteen miles per hour, the fall of the bed being about two and a half feet per mile; and this leads me to note that the velocity of the prior flood appears to me to have been under-estimated in an account I have seen (prepared I think by Colonel Cunningham). It is there stated that the flood water passed a village on the upper Shayok valley at 2 P. M. and that it reached Torbela at the same hour just two days after. From this a velocity of between eleven and twelve miles is deduced.

I should rather be disposed to think that only one day elapsed, and that the velocity attained to nearly twenty-three miles per hour, but for one consideration, which is this. The water certainly reached Attok a little before sunset, say about 6 P. M. and from Attok to Torbela is forty miles. This would give therefore, if the hour at Torbela be correct, a velocity of but ten miles per hour. I should expect, from the river here debouching out of the hills upon the Chuch plain, a great diminution of velocity between Torbela and Attok, (to be to some extent recovered below Attok), but not such a falling off as this; and therefore I think it probable that the time at

Torbela was somewhat later than 2 P. M. on the day after that on which the dam gave way, giving a velocity of about twenty-one and a half miles per hour to Torbela, and of thirteen thence to Attok. But, however, that may be, as I was at Attok on the 10th and at Kallabagh on the 12th, as I made enquiries on the way down, and at Maree, opposite Kallabagh, found an European Patrol Officer who could speak with certainty on the point, the rate I have given above may be accepted as an accurately observed one for the portion of the river I have particularized. The highest velocity I have obtained in the annual floods at Attok is thirteen miles per hour, and judging from what I know of times of transit, I should estimate the highest ordinary velocity between Attok and Kallabagh at eleven miles for the whole way. With regard to the velocity on this occasion above Attok I can only offer the following,—presuming the obstacle to have taken place as on the former occasion in the vicinity of the Nubra valley, we cannot assume the place at less than 9000 feet above the sea-level, or say 8000 above the Indus at Attok. Taking the extreme distance at six hundred miles we have a mean fall of  $13\frac{1}{3}$  feet per mile to set against the  $21\frac{1}{2}$  feet per mile from Attok to Kallabagh, while we know that as far as Torbela the river runs in a comparatively confined rocky channel and at all times with considerable velocity. It seems probable then that up to Torbela the velocity with which the first flood water travelled, considerably exceeded 15 miles per hour, that from Torbela to Attok it did not attain this velocity, but that it did from Attok to Kallabagh, below which place again it fanned out more leisurely, until 150 miles below the effects were hardly to be discerned and the time of first arrival cannot be ascertained. The flood water reached Attok at 6 A. M., and the rise was at its maximum about 1.30 P. M.; the total height attained above cold weather level was 80 feet, while the earlier flood, I estimate from all the information and circumstantial evidence which I have been able to procure, culminated at 12 feet higher. The annual flooding in July and August reaches about 50 feet; in 1856 it was a little over that; in 1851 it was almost exactly 50 feet; while in the other years I have observed it, it has fallen a little short of that height; so that this flood may be taken at Attok to have been 30 feet over the ordinary flood



level. At the time the occurrence took place the river was about half level, so that the rise which ensued in  $7\frac{1}{2}$  hours was 55 feet nearly. This rise was of course greatest at first, and during the last hour or two very gradual. About 10 o'clock the rapid increase ceased, and when I then crossed the river (not without danger) it was about 6 or 7 feet lower than the maximum height which it attained. This would give for the 4 hours a perpendicular rise, on the mean, of 12 feet per hour. I was close to the bank during the whole time, and though more intent on saving the boats &c. than on watching the progress of the water, can give an approximate conjecture as to the rate at which the river increased. During the first hour it rose about 26 feet, second 12 feet, third 7 feet, fourth 4 feet. At first it came welling up quite quietly, but very rapidly, not less for a little time than a foot per minute. This of course did not last very long, for as the width, the depth and the velocity increased, so did the discharge, and while the rise was very obvious till about 10 A. M. it then ceased to strike a transient observer. The width meanwhile at the narrowest part at Attok was a little over 1500 feet, the breadth before the flood came down having been about 800. I have not had an opportunity of ascertaining what the rise was at Torbela and above it, but it must have been in the general greater than at Attok; that is, in places with the bed as narrow, and the banks as steep and immoveable, and with the egress as confined, a greater rise will have taken place; for below Torbela lies the Chuch plain, sloping in comparison gently to the river. Over this ground the flood-water widely extended, and gradually returned, while the general direction of the Indus and of the Cabul river a little above their junction is almost directly antagonistic, and the Indus flood, keeping in a great measure its course, rolled over the stream of the Cabul river and filled up its channel and the adjacent low ground to a length of about 30 miles, with an average breadth of more than 2 miles, and a depth at base of 60 feet above the original level of the stream. This large safety-valve exhausted much of the destructive effects which would otherwise have been felt below; though the country was probably a loser rather than a gainer by the exchange; for the valley of the Cabul river is low, well cultivated and thickly populated in comparison to any tracts I know near the bed of the Indus.

Below Attok we find a comparative diminution of violence, though between Neelab and Shadeepore where the river finds a passago through the limestone range of the Neelabgosha the channel being in general narrower, abounding too in sharp turns where dead walls of rock oppose a bar to a free run, and throughout being closed in by steep limestone cliffs, the height attained by the flood is in parts even greater than that recorded at Attok. Leaving the limestone for sandstone, the channel widens out and becomes less abruptly tortuous, so that between Shadeepore and Mokkadd, the maximum rise is much less than above; still more is this the case through the gravel hills which dip even less steeply into the channel, and which have at foot been worn more to the requirements of the river.

Here the rise reached only 10 or 12 feet over the annual flood mark.

The hills of the salt range, through which the river runs just above Kallabagh, did not cause such an additional rise as might have been expected; for the passage through is short and below all is open. The height as measured at Mr. Mathew's house at Marree gave only 8 feet above flood-level. The annual rise here which at Attok is 50 feet reaches only 16 or 17 feet over cold weather mark. Below Kallabagh the river fans out very remarkably, with however a strong set upon the right bank. Here the rise was very small indeed. The annual flooding at this part attains no great height, and is principally striking by its vast expanse. Damage resulted below Kallabagh, but not by submergence, it was the effect of the set of the current alluded to.

Farther down, the effects are marked not by inundation and destruction but by the after-result, a comparative subsidence which covered all the islands and flats along the right bank of the river with the spoils of the regions above. The extensive mud-banks and reed-jungles in the vicinity of Esankheyl were particularly rich in this deposit; and between Kallabagh and this place we were fortunate enough to recover 17 out of 20 of the large boats (about 30 tons measurement) which had been carried away from their moorings below Attok. A little below Esankheyl where the Koorum river falls into the Indus, we got the last of the

boats, and observed the harvest of drift wood, so abundant above, *tail* away and disappear. Beyond this only a few straggling pieces made their way. A slight rise, but insufficient to suggest anything beyond the usual rains of the season, was observed between Esankheyl and Dera Ismail Khan; below that, nothing was noticed unusual. The swelling of 1856 which at Attok we know did not attain by  $28\frac{1}{2}$  feet the rise of the 10th August last, seriously injured Leia, and almost washed Dera Gazee Khan away, breaching an embankment which had been constructed above; so different are the effects after passing over a large extent of flat country of the continuous swelling of the river and a flood which alone attained a much greater height, but was transitory in its nature. The same fact I observed in my enquiries about the flood of 1841, which was also but little regarded below Kallabagh. With reference to the running off, of the flood-water, it is difficult to speak with much precision. There was a violent storm of rain about Attok on the 7th August, and I know that storms in the Himalayas are often very wide spread and extend far down into the plains, not I mean exactly synchronously, but about the same time a disturbance will be found to have occurred over a large tract, in some parts snow, in others rain, and in others again wind and dust. In the summer of 1855 I thus traced two storms by their visible effects, and by enquiries from European Officers, the one nearly north and south, and the other westward—the directions in which I happened to be travelling—and each for a distance of about 300 miles.

It is possible then that the storm I speak of may have been a portion of one which swelled the pent-up lake, and issued in its outburst, but whether this be the case or not, the probable occurrence of rain in the hills about the time of the flood makes it impossible to assign any correct date of its subsidence.

The fall was at first slow, but the river was about 8 feet below its maximum by sunset, during the 11th the water however continued higher than the yearly flood ever attained to, and it was not till the afternoon of that day, that the boatmen would venture to man a boat to go down, alleging that all their usual land-marks were covered, and that without them they dared not navigate the stream.



During the night, however, the river fell a little over 20 feet and during the 12th it had, in actual height, returned very much to the position it occupied before the flood came down. But the stream was very violent and disturbed, for there had taken place on a grand scale the action which on a small one is annually repeated in August and September, viz. the filling up of the bed above stragulations, and at other points where a check is imposed on the velocity, with *detritus* of a solid character brought down from above. This induced much swell and great rapidity over these banks, and the process of their being cut away from down stream upwards made itself apparent. For several days the ferry at Attok was nearly closed on this account, and the boatmen pointed out with some apprehension very rough water in places where it had never been observed before. Gradually the shingle banks were removed from under the main stream, but it appears that there is still an unusual amount of *detritus* in the bed at Attok, and that the surface of the stream is sensibly raised thereby.

With regard to the "effects of the flood" I have little information about the tracts much above Attok; but I should have known if there had been extensive loss of life or property. That these escaped so far I attribute to the warning received about one month before the occurrence, and which, though under-valued by most of the officers to whom it was made known, was less easily disposed of by people living on the very bank of the river and bearing in mind what had happened only seventeen years before.

Without precautions taken, and I know that they were very general as far up as my information reached, such immunity as resulted could hardly have taken place; for the flood must have passed during the night from near Chelass to a little above Attok, and though the upper part of this tract, say as far as Torbela, appears more scantily peopled than either above it or below it, some of the villages near the river are situated within the rocky channel and placed upon the deltas of *detritus* brought down by small tributaries.

In such situations they are of course greatly exposed to the danger we speak of; and had no warning been received more injury than appears to have taken place must have ensued.

Where the flood came down during the day, as it did probably

nearly all the way above Chelass, and certainly every where below and west of Attok, people unless caught in some peculiar position could without much difficulty escape, except, as always happens in such cases, the few who, by over-eagerness to save property, expose their lives to foolish risks. There were very few human bodies (not above three or four apparently) seen to pass Attok, and the cattle and stacks of grain, straw, &c. which came down in considerable numbers belonged principally to the vale of Chuch.

Accounts regarding the catastrophe of 1841 agree in stating that many bodies were seen to pass Attok, and allowing for the probable amount of exaggeration, it is I think unquestionable that a very considerable loss of life then occurred, and had it not occurred then, there would probably have been more to chronicle now. The great cause of difference is clearly the experience of effects and the expectancy of repetition in the present case. A flood of the sort having happened within the memory of all the grown population, and having proved very fatal, as soon as warning was received in 1858 the people not only took precautions, but became prepared, on observing or hearing of anything unusual on the part of the river, to place themselves at a safe distance from it; without the experience of a similar disaster it was hard to tell what was going on or where it was to stop, and thus at Nowshera some people placed their property on the top of their houses when the rise over-stepping their calculations, destroyed both house and property.

At Attok again I saw natives, who had in mind what they had heard of the previous flood, go off at once up the hills, while the river was rising, though quickly by no means alarmingly so. It is also to be borne in mind that the former flood was much greater, for not only did it over-top that of 1858 by 12 feet at Attok, and the addition of a single foot in height to a torrent of depth, width, and velocity such as the Indus then presented would have been a very great increase indeed, but occurring as it did in May when the bridge-of-boats was up at the lower site, it had a much lower level to start from. For the bridge in question has never been held by the native boatmen after the submergence of a rock near which is their well known water mark, and the actual rise which took place in a few hours must therefore have been upwards of 80 instead of about 55 feet.

Now this greatly added to the danger, for people who found the water coming down were, from having had no experience of the sort of thing before, peculiarly liable to fall into the fatal error (by which most of the lives lost were sacrificed) of getting upon knolls or other rising ground, on which they found themselves surrounded and cut off before they were aware. In the present instance the civil officer applied to me in behalf of some individuals who were thus surrounded, near a village a few miles above Attok; they most fortunately escaped through the flood not rising over their knoll, and their waiting till an exit was again provided by the subsidence of the waters. Had the stream risen a little higher, their case was nearly hopeless; for of course under the circumstances, no means of assistance could have been brought from a distance. At Attok many of the houses in the Mullah Tollah or boatmen's village, just below the fort, were demolished, so was part of the opposing village of Khairabad, but in both cases the property was almost entirely saved. In the Chuch valley lying between Torbela and Attok, a few villages were wholly or partially destroyed, and in the valley of the Cabul river all those near the water as far as Nowshera. But in both cases the principal losses were in grain and other field-produce, and in cattle, both districts being low and well cultivated. Heavy loss was also sustained, principally by householders, at the station of Nowshera, and by Government in the destruction of roads and bridges, and stores of various sorts collected at Khairabad opposite Attok. On this point some interesting information regarding the vicinity of Attok will be found in the report of proceedings of a special committee of which Major Robertson, Lahore and Peshawer Road, was president; and which was assembled in September last with the view of considering points relating to the catastrophe which had just taken place.

Below Attok most of the villages are placed on the high banks, between which the river runs and there is hardly any cultivation near the water so that no damage of any note occurred till at Mokkadd about 80 miles below Attok, where upwards of 100 houses were demolished and some cultivation destroyed. Marree also suffered, though to a less extent, and Kallabagh, the last place where injury of that sort occurred, lost some 10 or 15 houses.

Below this, the chief damage done was the eating into the land on the right bank, an action which appears to go on, though in a very minor degree, almost year by year. For some little time as the water was falling the process was rapidly carried on, so much so that I saw the people busy cutting down fine large trees in order to anticipate the otherwise certain loss of the wood by the agency of the water.

All common mud and stone buildings on which the water rose to any extent were of course destroyed, no buildings of substantial masonry were, as far as I know, subjected in sufficient measure to the test. The Nowshera Barracks were not seriously injured, but they were not exposed to the violence of the stream, and the lowest of them had not more than 5 feet of water in it. A good many trees were certainly uprooted, because we found several cast up on the subsidence of the waters; but trees were not prominently observed floating down, and except in circumstances like those noted near Kallabagh trees were rather destroyed where they stood than carried away.

The upper waters of the Indus, where I conjecture the stoppage to have occurred, run through a country almost destitute of vegetation and it does not appear that along the course of the main river there are forests so situated as to have been affected by this flood. A good deal of drift wood was floated out of the creeks into which Nullahs coming down from the more wooded country empty themselves, but this occurs always on the river being greatly flooded by the summer rains, and on this occasion was not a feature of unusual prominence.

Dead animals too were rare. The higher Indus valley is very destitute of cattle, and part of what did exist there probably owed their safety to the warning communicated to their owners.

The banks, where not rocky, suffered according to the set of the stream, but not at any place that I know of to any very remarkable extent except below Kallabagh, to which allusion has already been made. This extended from a short distance below that town to near Esankheyl, varying of course at different points. The greatest action appeared to be about 5 or 6 miles below Kallabagh, as the river was falling.

Fresh channels were opened in different parts of the river's course, where it is not circumscribed by rocky banks. The most noteworthy was at Attok, just below the seraie which lies up stream of the Fort. This is below the junction of the Cabul river, where the real bed consists of a double trough worked out in the slate Rock, which comes to the surface in the centre. This trough is 1300 feet broad, and hitherto since 1841 the river has in the cold weather run altogether under the right bank, leaving the other hollow filled up with large blocks of granite, boulders of various sizes, and sand. Since 1849 this has sometimes been entirely dry and sometimes has had an insignificant rill running over it, the tendency being for the rill slightly to increase year by year. But before the prior flood, a stream of considerable size ran here, and now again we have one upwards of 300 feet wide and about 5 feet deep. The river moreover seems to have set the materials in the bed above, so that a tendency to pour more and more water into the new channel has been established. The boat bridges now consist of one-third more boats than used formerly to be sufficient.

A little below Kallabagh again, where the set was so marked upon the right bank, its result has not been, as might have been expected, to deepen the channel running under that side; but by encroaching on the land it has actually shallowed it, so that the navigation, which was conducted exclusively in that channel formerly, cannot now make use of it, but is forced into another which was not previously passable for boats.

I do not think however that this change will prove of a permanent character.

Silt deposit has taken place to an enormous extent wherever there has been a checked or diminished current, particularly in the Chuch valley above Attok, the valley of the Cabul river, and every Nullah and stream opening into the river. Of all the effects produced, this is the most striking and will doubtless prove the most lasting. In constructing the Road Trans Indus, we passed over for several miles the silt deposited by the flood of 1841. Where cultivation had been carried over it, it was no longer to be recognized, but, where the land had been left unused, it was still found overlying, in the shape of a fine grey admixture of sand and clay about 15 inches



thick, the very different natural soil below. In August 1858 the Trunk Road for nearly four miles to the East of Attok, and on the west, wherever sufficiently low to come under the influence, up to beyond Nowshera, was buried under this deposit. The total length so covered was 12 miles, and the depth averaged one foot, while wherever the silt was left on the road it equally covered all ground on the river side and a good deal on the upper. The water of the flood was surprisingly muddy and wherever not agitated by a violent current deposited this silt in abundance. It seems, as far as I have been able to ascertain, that this silt is highly injurious to garden ground—and there is a good deal of vegetable cultivation near Attok—but that for the ordinary cereals it does not do any harm when ploughed up with the subsoil. The natives complain of it as burning up their cultivation through its not retaining a certain quantity of moisture and from the quantity of sand it contains. Where laid thickly and in sheltered situations, it remained in the form of a sticky mud for 2 or 3 months; but in the open fields it cracked in every direction, and in about a month and a half was fit to be ploughed up. Going from Attok towards Nowshera the extent visible was very great, and, before the grass and weeds burst through the cracks, the appearance was that of very striking desolation. But no where was this objectionable deposit productive of more annoyance than on the Grand Trunk Road, which, in spite of the measures taken at once, was impassable for about ten days, till the silt dried; and when that process was complete and the cake got broken up, it issued in a light fluffy dust, which causes a heavy drag on all traffic; and in dry weather, rises in clouds almost unbearable. All the road which has thus suffered had been metalled with shingle, was in all respects nearly finished, and was beyond all comparison, the smoothest and most pleasant piece of road between Lahore and Peshawur. It sustained no injury of any moment beyond what I have particularized; and it was not at first, nor till some three months had elapsed, that we became fully aware how much the silt deteriorated the road surface for purposes of traffic.

A good deal has been done to remedy the injury and in the course of another year it is to be hoped that it may be entirely effaced. The silt appears to consist of very fine sand with just sufficient

clay to cement it together, and if it could be kept damp (not wet) would yield a soft, but, for light traffic, a very pleasant and suitable surface.

The last point to which attention is directed is the peculiar effects of the flood upon the Cabul river.

The slope of the bed of this river is a little under 2 feet per mile and very uniform throughout the part affected. The directness with which it lies contrary to the course of the Indus has already been noted, and it would appear that the flood water, finding vent that way, ran over the down stream of the river, no doubt checking it and interfering with it in some degree, but probably not altogether destroying it.

The velocity with which the flood passed over the Cabul river was probably at first somewhat greater than what it had through Chuch, diminishing as it ran up. Nowshera was reached about 8 A. M. giving a mean speed of upwards of 10 miles per hour. The first effect observed there was, that the water was running backwards a little more rapidly than it usually ran forward; so singular a statement, as it would appear at first sight, was naturally, till often reiterated, met by incredulity. But when the fact became certain, there could not be much hesitation about the cause, especially as it was well known that on the prior occasion great destruction had taken place at the city of Nowshera, and as the residents in the cantonments were well aware of the report that another such flood might be expected. Soon light materials, particularly stacks of wheat-straw, were seen floating up, and these were heaped against the bridge of boats, which now curved up instead of down stream, and at last in the course of the forenoon broke up by the snapping of the two strong cables (one inch and seven-eighth inch) which, heavily fastened down at their extremities, and passing over low towers, supported the boats against the stream. These being now in part released were carried up the river, and some were stranded on the open plain 7 miles above. The flood still continued rising and was at its maximum at Nowshera about 3 P. M., about which time the last of the dwelling-houses, which were mostly built between the Trunk Road and the river bank, fell to pieces. It was observed that such of the houses as were not provided with upper windows gave the appearance of a



sort of blowing up when they fell after the water had covered the doorway. There must have been, on such occasions, a certain amount of compressed air within and while I don't think that it could have lifted the roof, yet, when the walls gave way and the structure fell, it was to be expected that the air would make its exit through the breaking roof, and so carry a cloud of dust up with it. The barracks being of brick masonry (and particularly good brick masonry,) and being on higher ground than most of the other buildings in the station, escaped without material injury. The flood now reached about 30 miles up the river, but stopt short by about 6 miles of the point where that of 1841 was distinctly to be traced to.

The height attained in the lower part of the Cabul river valley was very striking. It appeared to surpass anything reached near Attok. The causes I think were, that below the junction the right bank, on which the Indus would infringe, is bluff, and a side-current would be set off up the Cabul river, while again, as is observed of the tide, which in gulfs far surpasses the height attained in the open sea, the water, pouring in through a narrow opening and spreading out into the valley beyond, would maintain a fall in that direction; and before the check reached back again to the mouth a quantity greater than the fair capacity of the closed *sac* would have been forced into it.

The stream turned perceptibly by the evening, and ran down during the night, and this circumstance was the cause of much loss of property which in the day light might have been saved. Natives appear also to have had a dread at Nowshera of entering the water on account of the number of snakes and rats which were driven from their holds as the water rose. Nothing of this sort was observed at Attok, though there were a few serpents in the water. This is usual however in the large rain floods which occur yearly.

During the morning of the 11th household furniture in considerable quantity from the station of Nowshera was seen to pass Attok; and stacks of straw, Persian wheels, and such things, in large numbers from the valley of the Cabul river.

The deposit of silt was very great throughout the valley, as might have been expected in such a blind opening, and the water, after the

turn, ebbed away with sufficient gentleness to leave it nearly undisturbed over all the open ground beyond the actual banks of the river.

The out flow in the bed also does not appear to have been peculiarly rapid, and no remarkable cutting away of the original solid banks was observed.

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*Letter addressed to R. H. Davies, Esquire, Secretary to the Government of the Punjab and its Dependencies.—By Major J. BECHER, Deputy Commissioner, Cashmere, 1st July, 1859.*

SIR,—I have the honor to acknowledge your letter of 2nd April, 1859, directing me, in accordance with the instructions of a despatch from the Secretary to the Government of India in the Department of Public Works, to ascertain the particulars of the recent inundation of the river Indus in August 1858, and to trace the residence of certain syuds of “Kangri,” or “Kangra” who are reported by Captain Henderson to have conveyed to the boatmen of Attok, a written warning of the coming danger.

When your communication reached me, I addressed Captain Sandilands (who is Officiating at Attok during the absence of Capt. Henderson) requesting him to send me the original paper, from which I should best be enabled to identify the authors; I also asked him to record the evidence of the boatmen, who had affirmed that the letter was authenticated by the same signatures as that alleged to have been received by them in 1841 on the occasion of the previous flood.

It seemed surprising that such an intimation should not first have reached Jehandad Khan of Umb, the principal Chief on the river's bank above Attok, for if it came from the source of the obstruction it would have been passed downwards from point to point, as had, I knew, been done in 1841.

Captain Sandilands replied that no document had reached the boatmen direct,—that the writing alluded to was a copy, which had been forwarded to the executive Officer, from the Office of the Assistant Commissioner at Attok; and he appended a copy of this and the depositions I had requested.

The deposition of the Jemadar, and head boatmen of Attok, is to the effect that their communication "to Captain Henderson related only to the flood of 1841 in the reign of Maha Raja Sher Singh when such a letter had come to them; they remembered only the name of Syud Kasim, but not where he lived. On the present occasion they had received no written warning nor any reliable information—only the general rumour."

The copy of the letter sent by Captain Sandilands was dated 29th Har. 1915 S. (about 10th July, 1858,) bearing the seals of "Syud Jumal" and "Syud Kasim," addressed to Zerdad Khan, Meerdad Khan and others of the Tarkheylec tribe, living at Kazcepore, near Huzroo.

I then wrote to the Assistant Commissioner and obtained the original letter.

Syud Kasim, and Syud Jumal are brothers—Syuds, generally known and respected, living at "Kalinjur" in the Jagheer of Jehandad Khan near the Indus, in Huzara. I know them both well, and Syud Kasim had informed me of the general report that the river was obstructed somewhere in its upper course.\* The letter was at once acknowledged; they had written it to their marriage relations (whom I also know) on the authority of Jowala—a trader of their village who had received, and read in their presence a Hindee note from his brother Khuzana of Umb (Jehandad Khan's place) informing him that he (Khuzana) had learnt from intelligence which the Khan had received, that the river was shut up in its bed, and therefore he had sent off his property for safety.

Khuzana being called, stated that he was with Jehandad Khan at Bara (on the hills above the left bank of the Indus) and that the Khan advised him to remove his property from Umb, as one "Nasir Shah" of Bimbal (a village two days' journey from Umb in the independent country of the Akazye tribe) the brother of one of the Khan's servants, had written, that news had reached from a Raja "Gohreetan" or "Gohr Aman," that two tributaries of the Indus were closed.

\* I made this generally known to all the villages of Huzara on the Indus, telling them to be on their guard and to make what arrangements they thought best.—Scarcely any loss occurred to property and none to life.

He (Khuzana) did not know who this Raja was, or where he ruled; he believed he was somewhere "*high up the river.*"\*

Jehandad Khan had died in the interim, but his minister Mahamud Ruffahn stated that the Khan had received no message or writing from any Raja, and no more authentic account, in support of common rumour, than a letter from "Nasir Shah" of the Akazyé tribe, brother of Gholam Khan, one of the Khan's servants, which contained no particulars beyond the information of persons coming "*from above,*" that the river was somewhere closed. The Khan, however, took the precaution to remove his effects from the river's edge to Dogana. He had no means of acquiring *certain* information, having no communication with the Chiefs above; but in 1840-41, just before the former great flood, a writing on the bark of the birch tree (bhoj putta) was sent down the river from above as a warning; it was not known from whence; but was said to come from a tribe of some name like "Hoodur."† It conjured all men, Hindoo and Musulman, to fly from the river's side, and was couched in general terms."

I then addressed Syud Umran of Sultanuh on the Indus, a man of great repute, as the brother of Syud Ukbur Badshah of Swat, asking him, if he had received intimation of the recent flood of 1858. He answered that he had received none in this instance; but that, in 1841 Syud Ukbur had received several communications from priests (Oolmah) of Gilgit.

Hence then, as to the writing sent down from somewhere near the site of the barrier of 1841, there is no doubt, it is universally spoken of in Huzara; and, since I have been in Cashmere, I have learnt that Raja "Kurreeem Khan" of Gilgit sent a warning *written on bark* to the inhabitants of the plains, the bark being used to convey greater credit. But as regards the late inundation of 1858, no such communication from the spot seems to have been made.

\* Gohr Aman is the Raja of Yussim who lately defeated the Garrison of Maha Raja Golab Singh in Gilgit, deposed the protected Raja of Gilgit (a minor,) and seized his country. He is chiefly known from his custom of selling men as slaves or exchanging them for dogs.

† There is said to be a village named "Hoodur" under Gilgit on the borders of Chilass on the right bank of the Indus; though it does not appear in the map.

As I mentioned in my letter of 29th March last, Captain Henderson had travelled from Cashmere towards Ladakh, and up some portion of the course of the "Shayok," one of the main tributaries of the Indus, had seen huge glaciers borne down or projecting into the stream, and in all probability had read Captain Alexander Cunningham's book on Ladakh, where this "cataclysm" of 1841, as well as those previous to it,\* is fixed at 30 miles below the village of Sasserh, and 20 miles above the junction of the river Chang Chinmoo with the Shayok.†

Following up this direction on the map,‡ he found near the head of another branch, issuing from the Nubra lake, the village of Kangree, which seemed to represent or resemble that from which the letter of the Syuds came.

But as the letter from which the deduction is drawn, proves to have travelled only a few miles from the Syuds of *Kalinjur in Huzara* to the Tarkheylees of Kazeepore, and as I can learn nothing of any Syuds of Kangri,—I have no doubt that the mistake has arisen from the similarity of the Persian letters in the two names, and I think this disposes of the questions of the previous warning and of the locality of the informants.

It is certainly very desirable to ascertain the locality of the late obstruction, and I have purposely deferred my reply, as I was on the point of leaving for Cashmere where I should have the greatest facility for enquiry; but in my letter of 29th March I have already indicated the spot as in the vicinity of Gilgit. This was the result of my enquiries from the frontier beyond Huzara, and of information communicated by the authorities of the Maha Raja of Cashmere,§ whose Fort of Boon-

\* In 1826 and 1833, A. D.

† See Cunningham's "Ladakh," Page 101.

‡ Map of the Punjab published in the Office of the Surveyor General of India.

§ Translation of a letter dated 15th Asaj, 1915 or 30th September, 1858, from Wuzeer Pooouo, Offg. Governor of Cashmere, to the Vakeel of the Maja Raha of Cashmere at Huzara.

“\*\*\*The Hurkura (messenger) I sent to Iskardo has returned and reports that the river coming from Gilgit joins the Attok (Indus) 4 coss above the Fort of Boonjee, and a branch coming from Nuggur and Hoonza joins the Gilgit river below Gilgit. The late inundation proceeded from these "Hoonza", and "Nuggur" rivers, there was a lake above Hoonza in the mountains, the waters of which were dammed up and have now been set free. Have the goodness to communicate this to the Deputy Commissioner of Huzara.”



jee in Hussoora district is situated on the left bank of the Indus, between the confluence of the rivers of Gilgit and "Astor" or Hussoora, and watches the road to Gilgit.

Since I have been in Cashmere, I have carefully questioned men from Gilgit, Hoonza, Nuggur, and Ghor, and particularly two (Mahomed Khan and Hunneefa) who had left Nuggur only 24 days deputed by the Raja Zaffir Zaid Khan to ask the aid of the Maha Raja against Raja "Gohraman" in Gilgit. All accounts agree that the *late stoppage*\* was of the river of Hoonza, about a day's journey above the fort and town of that name, and 4 or 5 days journey Northward of Gilgit. It was caused by the subsidence of a mountain side called "Phungurh" on the left or Nuggur bank, from the action of rain and snow above, and of the stream below, in the winter of 1858. The vast fragments of rock, and earth, and trees and drift wood, dammed up the *narrow bed* of the river for 6 months; when the waters swollen from the melting of the snow in the mountains, burst a sudden passage in August, and destroyed many forts and villages and lands of the Hoonza and Gilgit districts. The lake mentioned by Wuzeer Poonoo was probably the back water of this huge dam.

Captain Montgomerie of the Engineers, who has charge of the Grand Trigonometrical Survey in Cashmere has arrived at the same conclusion regarding the site of this barrier of 1858, by an enquiry altogether independent of mine.

I have already reported that men† were deputed by me from Huzara in the direction of Gilgit to make personal enquiry and if possible see the very spot; but letters from the border of the Kohistan country with Gilgit, received on 26th May, declare their inability to proceed further, because of hostilities between the Chief of Nuggur and those of Hoonza and Gilgit; "the road is closed to all travellers, and four men, who lately went from Chilass, were robbed and put to death."—I had hoped to have been able from their enquiries to confirm or dispel a present disquieting rumour that one of the five tributary rivers near Gilgit is still obstructed.‡

\* Of 1858, A. D.

† Izzuttoolla Khan, Syud Sufdur Ali.

‡ It was reported originally that two tributary rivers had been stopped, of which one has set itself free and the other remains closed.



The Maha Raja's Officers in the Fort of Boonjee have on my applications, sent back several replies said to be from the best information, that the river (above Chilass) is nowhere impeded, but is rolling on with its accustomed volume; the latest report is of 8th June, 1859 (28th Jait, 1916). Those whom I have seen, inhabitants of that country, say the same; the two men of Nuggur, whom I have named above, only add that the bed of the Hoonza is still somewhat encumbered by remaining rocks, and that a guard is maintained there by the Nuggur Raja to prevent the crossing of the hostile people of Hoonza by throwing over a bridge of rope or timber. Nasir Shah of Bimbhul, the man of the Akazye tribe whose information conveyed to the Khan of Umb proved so true—although he is very far from the spot—now writes that during last April there was general alarm of the flood coming anew, and all people removed their property; but that they have now brought it back, although no certain information has come, one way or the other.

My opinion is, that there is now no real cause of apprehension; it is only natural that the rumour should be revived—it was so after 1841; but the certainty is hard of attainment in a country so cut off by difficulties, political and geographical—and beset with so much disunion and enmity and ignorance and jealousy and entire disregard of all but immediate interests.

As regards the removal of the obstacle (when such an accident may again occur) by our scientific efforts, I think it is impracticable; the labour of removing such vast masses of mountains, or of glaciers, would be immense; and as our motives would not be understood, the party would require the protection of an army if in the direction of Gilgit. None of the Maha Raja's people even can venture there. An expedition against Raja Gohraman is now being prepared.

Although it is somewhat beyond the limits of the present enquiry, I have taken advantage of the present occasion to endeavour to make sure of the site of the obstruction of 1841, A. D.

Captain Alexander Cunningham places it 280 miles above Iscardo, near the head of the Shayok branch of the Indus, about half way in a distance of 50 miles, along which the road to Yarkund was said to be inaccessible, when he and Captain Strachey and Dr. Thomson visited Ladakh in 1847; but none of these officers saw the spot thus indicated.

Captain Cunningham records three inundations of the Indus since A. D. 1822, in the years 1826, 1833 and 1841.

In 1837, Mr. Vigne travelled beyond Iscardo, and learnt that a few years previously (1833) a serious flood had come down the valley of the Shayok, which was attributed to the bursting of a glacier by which the waters of a large lake, called the Nubra Tshu, had hitherto been upheld; and he added that "so well was the cause of this inundation known to the people, that it was believed that the same terrific visitation might be expected again at no very distant period." Captain Cunningham, who quotes this passage, immediately adds "the *expected* cataclysm occurred in June 1841, *but it was immensely greater in volume and more devastating in its effects than the previous inundation of 1833.*

In the edition of 1844, Mr. Vigne adds a note as follows, "Since writing the above, I observe that a letter from Dr. Falconer dated 8th August, 1841, has been read at the Calcutta Asiatic Society, containing a notice of some devastating inundations that have taken place on the Indus below its debouchure; and it is highly probable that the glacier of the Nubra Tshu may have again been broken up. \* \* \* \* \* From the openness of the bed of the river, as seen from Aho, I should also imagine that the obstruction must have happened above the place marked on the Map, "Makpon-i-Shang Rong."\*

Captain Cunningham proceeds to give the testimony of the people of "Chulung," "Tartuk," "and Tertse" (places on the bank of the Shayok river, but about 130 miles below his assumed site of the accident) and affirms that the effects could in October 1847 be traced to a height of more than 20 feet above the stream, where straws and twigs were massed together in lines 2 or 3 feet broad.

As Captain Cunningham's own route did not include this portion of the country, the above information was probably collected by Dr. Thomson. At that season (October) the river always falls considerably, so that these lines of grass and twigs may possibly have

\*This spot is opposite Gilgit, and at least 400 miles below Sasserh. It is described by Captain Cunningham as a place of craggy defiles, where the waters of 1841 must have been massed up at least to 100 feet. It is near the point where the late obstruction of 1858 is asserted to have occurred.

been the deposits of the summer high water, or they may have been the residue of 1833, or of another local flood. It seems certain that an inundation of the Shayok did occur in A. D. 1833; it is corroborated by the information I have received in Cashmere; and as every one knows what pains is required to prevent a confusion of dates and occurrences in any account given by an Asiatic, and how difficult it is to keep them to one precise clear account, it is not improbable that the calamity of 1833 was referred to in the testimony of the inhabitants of Chulung, Tertse, &c., whose Tibetan language would require an interpreter, and who must have been ignorant of the flood of 1841, if it took place at any distance *below* their villages.

In reading Captain Cunningham's account, I am impressed with the idea that a conclusion was at once drawn that the origin of all the cataclysms of the Indus was from one cause, and at one and the same point, high up among the glaciers of a tributary stream where the waters are chiefly generated by the snows.

In my letter of 29th March, I stated that this opinion was not borne out by native statements, and since I have extended my enquiries, I am the more convinced that the great flood of 1841 occurred about 400 miles *below* the site specified by Captain Cunningham,\* and was caused by the arrest of the *main Indus*, across which a mountain called Ultoo Kunn subsided at a narrow place about five coss south of "Ghor," two or three coss above Tuleycha, and four or five coss below the Fort of "Boonjee" (in the district of Astor or Hussoora, where the Maha Raja of Cashmere has a garrison).

Boota Khan, a man of Ghor, in the service of the Raja of Nuggur, now in Cashmere gives the most exact account, and declares that he saw the actual dam; that some men of his village chanced to be washing in the river for gold, and were buried by the fall of the soft soiled mountain, which he attributes to an earthquake. He also saw the spot after the waters had forced their way.

I directed Meerza Syfodeen, the Cashmere newswriter to refer to the reports of that time written by his father, Meerza Ahud, to Sir George Clerk at Umballa; and those of April and June 1841, before

\* As near "Sasserh."

and just after the event, seem to refer it to the neighbourhood of Hussoora and Gilgit.\*

The inundation of 1833, caused by the accumulation of ice in the Shayok branch, was more local and comparatively harmless; it is not even known in the plain country of Huzara, Chuch, or Attok. Captain Cunningham describes that of 1841 as "immensely greater in effect," which is hardly to be explained, if the cause and the position was the same in both. I have not been able to consult Dr. Thomson's work, nor the paper of Dr. Falconer addressed to the Asiatic Society in 1841.

The recent cataclysm of August 1858, is I think proved to have been that of the *Hoonza branch*, which at least affords an example that the site can vary; this is 300 miles from Attok. Yet no remarkable difference was previously visible in the state of the lower Indus in Huzara or at Attok; whereas in 1841 (before the flood) the river was fordable, and shrunk wonderfully to a small stream, I do not think it would have been so, had only one tributary like the Shayok been dammed up 600 miles above at Sasserh. Again, in 1841 when, as I believe, the main Indus, after the junction of many tributaries, was arrested, when the barrier was burst, down at once in one overwhelming irresistible wall came the "bore" of discoloured waters, defying all hope of escape, while latterly in 1858, the rise though great was gradual, and afforded a warning for flight.

\* Copy of Intelligence from Meerza Ahud in April 1841.

I. "From Hussoora and Gilgit, news has arrived that in last January a mountain (by reason of an earthquake) fell into the Indus or Attok river, and has closed the course of its stream, up to the 1st May, 12 coss of lands in the Gilgit district has been submerged. Jubbar Khan the Chief of Hussoora sent in a note to Cashmere that the waters would continue pent up for another month, and after that would force a passage in *some direction*."

From the above in June, 1841.

II. "From Gilgit the news is that the waters of the Sinder or Attok by reason of the fall of a mountain were brimmed up *in the direction of Gilgit* for a long time, and there was a lake reaching to a distance of 18 coss; high hills were on all sides; when it had risen immensely, the river forced its way with great velocity and is now pursuing its natural course—many villages of Ynsroofzye, Chuch and Huzara have been destroyed by the deluge."

It seems then, from what has happened within our knowledge and from the character of the many tributaries of the Indus, and of the mountains, and rocks and glaciers which confine and check their course, that these accidents may often occur, and in many different places; it must always be exceedingly difficult to obtain accurate and timely information, and scarcely possible always to determine the exact place, but as I believe that a stoppage of any tributary above Iskardo or at least Ladakh, would hardly affect our territories on the Indus, and as the Maha Raja of Cashmere has posts along the main river, I think that information may always be had through Cashmere, the authorities being enjoined particularly to observe the river, and in the event of any suspicious fall or rise to communicate with Gilgit, Nuggur, Yussun, Hoonza and other countries beyond their border, with some parties in which, the stronger or the weaker, they have generally some relations.\*

The Deputy Commissioner of Huzara, in the event of a rumour, should endeavour to obtain intelligence from Chilass and from Koli and Palus in the Kohistan country, which may best be managed through the Syuds of Khagan. The Khan of Umb also should endeavour to cultivate some acquaintance with influential men, or Moollahs of the Kohistan, and Gilgit country, and the Akhoonzada of Kotah in Yusoofzye, who has great religious influence, is also a man likely to acquire the best information, if the several chiefs near Indus who are his votaries will press the matter on his attention, as it has now been proved that these calamities may occur at any time.

A little exertion will generate a valuable intercourse, and dispel the ignorance and marvellous indifference which now exists, and almost peoples with "anthropophagi" the "upper regions" of the Indus.

\* I may add to the difficulties of communication, that for half the year the passes in the mountains are closed by snow, and intercourse is nearly impossible.



On the different Animals known as wild Asses.—

By EDWARD BLYTH.

At least four distinct species—if the *Dshiggitali* or *Kyang* (*EQUUS HEMIONUS* of Pallas) be considered to differ specifically from the *Koulan* or *Ghor-khur* (*E. ONAGER* vel *E. ASINUS ONAGER* of Pallas)—have been confounded under the general denomination of ‘wild Asses’; and two of the four have likewise been designated ‘wild Horses’; a name to which they are less entitled, as all agree in exhibiting the few structural distinctions that characterize the *Asinine* sub-group apart from the *Equine* or *Cuballine*.

The systematic names bestowed by Pallas are so far unfortunate, that they do not apply to the particular species which were known by them to the ancient Greeks and Romans—one of which latter has only recently been discriminated by Professor Isidore Geoffroy St. Hilaire, by the name *EQUUS HEMIPPUS*. This (from its habitat) is necessarily the *Hemionus* vel *Hemippus*, or ‘wild mule,’ of the ancients; whilst their *Onager* (as the name implies) refers as clearly to the veritable wild *E. ASINUS*, which, to this day, as formerly, exists in numerous troops in N. E. Africa, if not also in the southern parts of Arabia and island of Socotra. The *HEMIPPUS* of modern nomenclature is the representative of the present group in Syria, Mesopotamia, and the northern portion of Arabia, where designated by Col. Chesney the ‘wild Horse,’ as distinguished from his ‘wild Ass’ of southern Arabia; and it is the species figured in Wagner’s *Saugtheire* (1856), pl. 33, by the erroneous name of *EQUUS ASINUS ONAGER* of Pallas, from a living individual formerly in the Knowsley menagerie.

It should be especially noted that the great naturalist, Pallas, described his *E. HEMIONUS* from personal observation of the animal; whereas he describes his *E. ONAGER* only at second-hand, having never seen a specimen. Had he personally inspected the latter, it is exceedingly doubtful if he would have recognised the two as distinct species, or have considered the western animal to be the real *Onager* or aboriginal wild Ass. In his account of the *Dshiggitali*, he remarks—“On ne doit pas le confondre avec l’âne des



steppés nommé *Koulan* par les Kirguis occidentaux ; *les détails que je me suis procurés sur ce denier*, m'ont convaincu qu'il étoit l'âne sauvage, l'Onagre des anciens. Le *Koulan* se tien par troupeau dans les landes montagneuses de la Tatarie occidentale, comme le *Dshiggital* dans les deserts de la Mongolie."\* Curiously enough, we at present know the *Dshiggital* or *Kyang* more as a mountain animal, in the elevated wilds of Tibet, and the *Koulan* or *Ghor-khur* more as an inhabitant of the sandy desert.

The late Professor H. Walker referred the Tibetan *Kyang* to *EQUUS HEMIONUS* of Pallas ; and the *Ghor-khur* of this country is even more satisfactorily referable to *E. ONAGER* of Pallas, figured by Gmelin : but Professor Walker committed the extraordinary mistake of figuring and describing an Indian *Ghor-khur* for a *Kyang*,† so that the alleged distinctions which he has pointed out are valueless. However this mistake originated, there is no doubt whatever of the fact. The animal was procured and sent down to Calcutta by the late Mr. Thomason, Governor of the N. W. Provinces ; who was just in the position to obtain a *Ghor-khur* from the western deserts, but scarcely a Tibetan *Kyang*. No doubt it was sold to him as a *Puháriá* or 'mountain' *Ghor-khur*, for this epithet is continually applied by the natives of India to any creature foreign to their own province, as the experience of readers who have been in the habit of purchasing animals in this country will readily testify. By what route it reached Mr. Thomason we are uninformed, as also how it came to be accompanied by a Himalayan pony from which it was inseparable ; but having compared Dr. Walker's figure and description with stuffed specimens of undoubted *Kyangs*, and with three living undoubted *Ghor-khurs* now in Calcutta, the conclusion here arrived at is irresistible.

\* *Voyages de Pallas*, IV, 305 (French edition, 1793).

In p. 309, I observe a statement which is worthy of especial notice, as being made by Professor Pallas. The existence of the pouch of the Great Bustard (*OTIS TARDA*) is denied by Professor Owen, though asserted by the Hon'ble Walter Elliot to be a characteristic of the Great Bustard of India (*EUPODOTIS EDWARDSII*). Of the former, however, Pallas thus writes—"Cet animal a un petit trou sous la langue, qui sert d'ouverture à une bourse aqueuse, qui est de la grosseur d'un œuf d'oie, et qui pèse souvent plus de trente livres. On ne connoît point ici la Petite Outarde." † *J. A. S.* XVII, pt. II, p. 1 and pl. 1.

While identifying the *Kyang* with the *Dshiggitai*, however, Professor Walker little imagined that he was making the same mistake that he considered M. Frederic Cuvier and others to have done, in referring the *Ghor-khur* also to E. HEMIONUS. I find that the *Ghor-khur* accords to the minutest particular with the *Koulan* or E. ONAGER of Pallas, figured by Professor Gmelin from an occasional variety bearing a short humeral stripe (which is not rare also in Indian specimens of either sex),\* from the presence of which the identity of this animal with the true Ass has been generally but erroneously inferred. Of the two individuals then at St. Petersburg, which are described by Professor Gmelin, it may be remarked that his male only had the shoulder-stripe, and his female not a trace of it; and he was informed that individuals had been seen with a second shoulder-stripe. This I have myself observed in the domestic Ass, and even a third and fourth, more or less developed, the additional being of variable length, and given off along the back as far as the loins; though it is very rarely that more than a single stripe occurs, and I have seen only one domestic Ass without the shoulder-stripe. Many of our Indian Donkeys have also well defined transverse bars on the limbs, which are permanent for life (not, as described by Professor T. Bell, peculiar to the foal); they are often black and strongly contrasting, placed rather distantly apart, and they vary much in length. It is remarkable that some races of Horses also have the same markings. The well known 'Eel-back dun' of England is so named from its black dorsal stripe, bearing a supposed resemblance to an Eel; the Indian Káttýáwar or rather Cutch Horse has generally, in addition, the shoulder-stripe, and Zebra-markings on the limbs, black and very distinct and conspicuous; and the same may be observed of many of the Shán ponies, from the independent states north of Burma, many of which are brought annually to Maulmein, and not a few thence to Calcutta. I have seen one of these of the pale drab colour usual in the Ass, with the cross and the stripes on the limbs deep black and

\* Jacquemont notices such a specimen, which he saw in Barrackpore Park. *Voyage dans l'Inde*, I, 170. Vide also *J. A. S.* XXVI, 240. In Pallas's *Zoographia Rosso-asiatica*, which I have seen since penning the above, there is a coloured figure of E. ONAGER, but much too rufous in the particular copy to accord with the description.

most conspicuous, the dorsal stripe being continued down the tail just as in the *asinine* series; yet in all other respects it was a handsome robust pony, with copious equine mane and tail, shewing no approximation whatever to the asinine group in its structure or voice. Those who believe that the domestic Horse is a compound species, derived from a plurality of aboriginal races, may well infer that they perceive, in the markings described, indications of certain of those races.\*

In some examples of the *Ghor-khur*, as that figured by Dr. Walker (from a drawing from life by Dr. Cantor),† there are no traces whatever of markings on the limbs; others shew slight traces, more or less distinct, chiefly at the joints; and others again have the entire limbs strongly marked: but the stripes do not resemble those often seen in domestic Donkeys, or in the races of Horse referred to; in general they are wavy lines of fawn, often more or less crossed or reticulate,—but in some more regular and Zebra-like,—upon observing which, I remembered the description in Bell's 'Travels in Tartary' (I, 224), of the 'wild Asses' found in the country of the Tzulim Tartars, "the hair of which is waved, white and brown, like that of a Tiger:" he "had seen many of their skins." So far as the limbs are concerned, this description is quite intelligible with reference to many Indian examples of the *Ghor-khur*.

\* It does not follow, because the hybrid offspring of the Horse and Ass is mostly infertile (the male mule perhaps always), that distinct species of the Equine or Caballine group, or of the Asinine group respectively, should not produce a prolific intermediate race, hybrid with hybrid. In the London Zoological Gardens there was formerly a triple hybrid, the sire of which was a Quagga, and the dam a cross between the Ass and Zebra.

The curious animal figured by Col. C. H. Smith, in his volume on the *Solidungula* in the 'Naturalist's Library,' by the name *Asinus hippagrus* (vel *equuleus*), appears to me to be a Chinese *hinny*, or offspring of the Horse and she-Ass. Its stripes might have been derived from either parent, if not and very probably from both of them. Col. Smith also figures what he terms an 'Eel-back dun' from the Ukraine, with the humeral cross-stripe but no limb-markings. In the text, however, he repeatedly alludes to those markings, as occurring sometimes in the 'Eel-back dun' race.

† *J. A. S.* XVII, pt. II, p. 1, and pl. 1. This published figure is bad, whatever the drawing may have been. There is no anatomy about it; and the grace and beautiful contour of the creature are not at all pourtrayed. The head, in particular and the haunch are exceedingly ill-represented.

It would appear that these limb-markings are never seen in the *Kyang*; but a narrow black ring adjoining the hoof would seem to be constant in this animal, as was first pointed out to me by Major Robert C. Tytler, the proprietor of the three *Ghor-khurs* now in Calcutta. This mark is also more or less developed in the *Ghor-khur*; but is by no means conspicuous in either race. In two stuffed specimens of the *Kyang*, old and young, in the Society's museum, there is no black shoulder-stripe, but in place of it the coat is there distinctly of a deeper shade of hue, so that the stripe is faintly indicated, as is best seen from a moderate distance. The same is observable, when especially looked for, in an unmounted skin. In one only of Major Tytler's three *Ghor-khurs*, there is a small narrow black line, on one side only of the animal, where the cross occurs in some individuals. In another *Ghor-khur*, which I saw in the Surrey Zoological Garden, there was an incipient cross-stripe, about an inch long on one side, and still less (the merest indication of it) on the other side. In the individual which Jacquemont saw in Barrackpore Park, he remarks that there was "une ligne noire transversale sur les épaules." Whether this cross-stripe is ever seen in the *HEMIPUS* remains to be ascertained.

Sir R. Kerr Porter describes a "wild Ass" without even the dorsal stripe; and as he completed his sketch of it from a second individual which he killed, our incredulity should therefore abate somewhat, even though his account remains uncorroborated to this day. All other observers seem to agree in describing the Persian wild Ass to have the usual longitudinal dorsal streak. Thus, in Morier's 'Second Journey through Persia' (II, 201), we read—"The wild Ass is of a light mouse-colour, with a dark streak over its shoulder and down its back," which may imply that a cross-stripe was also observed. Porter, however, states—"The mane was short and black, as was also a tuft which terminated his tail; no line whatever ran along his back, or crossed his shoulders, as are seen in the tame species." Such an animal does not appear to have been met with by any other person! Prof. St. Hilaire suspects that it will yet prove to be a distinct species. As an example of the vague misuse of names in which many authors indulge, it may here be remarked

that in Kinneir's 'Geographical Memoir of the Persian Empire' (p. 42), these animals are actually styled "Zebras or wild Asses!"

The voice of Major Tytler's *Ghur-khurs* is a loud shrieking bray. It is decidedly different from that of an animal which I heard in the Zoological Gardens, Regent Park, which also was a distinct bray, but much less harsh and discordant than that of a Donkey. This animal was probably a HEMIPPUS; and Prof. Is. St. Hilaire remarks that the voice of the HEMIPPUS is notably different from that of the 'Hemione,' meaning the *Ghor-khur*. Also that "le braire de nos Hemiones indiens, si l'on veut se servir pour eux de ce mot, diffère considérablement du braire de l'Ane, soit domestique, soit sauvage."\* When and where the distinguished Professor heard the bray of the wild Ass does not appear on the record; but the probability is that it differs little, if at all, from that of the domestic animal.

The *Kyang*, according to Major A. Cunningham, "neighs like a Horse;" and I suspect that it was upon his authority that Dr. Walker asserted the same, and that he had never heard the voice of the *Ghor-khur* which he described. Again, Mons. Huc remarks, of the *Kyang's* voice, that "le hennisement qu'ils font entendre est vibrant, clair et sonore."† On the other hand, Moorcroft asserts that "his cry is more like braying than neighing;"‡ and in an admirable letter, signed 'Norman Leslie,' which appeared in a late No. of the *Friend of India* newspaper, giving an account of a Tibetan tour and of the sport obtained in the course of it (including the 'bagging' of a noble specimen of the wild Yak), the following passage occurs relative to the *Kyang*, which is well worthy of citation:—

"As the spectator stands on the elevated land by the water-shed, he sees to the north the course of the Sutlej running from east to west through a table-land which is 14,000 feet high, and intersected with ravines; the Himalayas to the south look but an ordinary range of hills scarcely so elevated in appearance as the range beyond the Sutlej which bounds the view, and in which to the eastward the

\* *Comptes Rendus*, December 31st, 1855, p. 1224.

† *Souvenirs d'un Voyage dans la Tartarie, le Thibet, et la Chine*, II. 221.

‡ *Moorcroft's Travels*, I, 443.



peak of Kylas rises conspicuous. On the plains between the ravines herds of Kyang feed; they are more *asinine* than *equine* in appearance, are of a light red colour, with white belly and legs, and have the hog-mane stripe down the back, and tail of an Ass; the head is disproportionately large, and *they bray instead of neighing.*"

I have also been assured by actual observers, familiar with the voice of the *Kyang*, that it is "as much like *neighing* as *braying*;" but this I do not comprehend. It must surely be either one or the other. A *neigh* is a tremulous expiration only. A *bray* consists of alternate expirations and inspirations. And there can be little doubt that the *Kyang* will prove to resemble the other asinine quadrupeds in braying and not neighing, notwithstanding the highly respected testimony of Major Cunningham.\*

The resemblance of the two animals is indeed exceedingly close, again notwithstanding the assertion to the contrary of Major Cunningham, Dr. Hooker, and others,—greater even than that of either of them to the *HEMIPPUS*, which has a conspicuously smaller head and shorter ears. The size and figure of the two would seem to be absolutely alike, with a heavy but well formed head, longish ears, rather a short neck, and body and limbs of exquisite *turneur*, indicative of extraordinary fleetness. I have not seen the living *Kyang* or *Djiggetai*, but the croup is distinctly higher than the withers in the living *Ghor-khur* or *Koulan*. The colour of the *Kyang* is much deeper and more rufous than that of the *Ghor-khur*, and there is considerably more of white about the latter. The *Ghor-khur* is of the isabelline or sandy hue of most animals of the desert, but with a distinct rufescent tinge; its dorsal stripe would seem to be generally much broader than in the *Kyang*, though varying in breadth in different individuals: but it may be remarked that this stripe

\* I have never heard the voice of the Quagga from which that species derives its name. That of the *Ghor-khur* is considered by Major Tytler to resemble exceedingly the cry of a mule. The truth might, indeed, be anatomically determined. Thus, Cuvier remarks, of the Ass,—“sa voix rauque (appelée *braire*) tient à deux petites cavités particulières du fond de son larynx.” *R. A.*, I, 253. Pennant, following Pallas, remarks of the *Tshiggetai*, that—“their *neighing* is deeper and louder than that of the Horse:” a description which most assuredly cannot be reconciled with the *shrill bray* of the *Ghor-khur*!



varies much in width in the domestic Donkey, at least in the diminutive Indian race of Asses, being in some individuals of the latter quite as broad as in any *Ghor-khur*: this mesial stripe, however, seems to be broader down the tail in the *Kyang*, and is continued down to the black terminal tuft; whereas in the *Ghor-khur* (perhaps with exceptions) the line is narrow on the tail and terminates at some distance above the tuft. Again, in the *Ghor-khur* the dorsal stripe (which in both is of a dark chocolate colour rather than black) is more or less conspicuously bordered with white—as likewise in the HEMIPPUS,—and this white extends broadly and very conspicuously towards the tail and along the hind-margin of the buttocks, where in the *Kyang* (as also, I since find, in some *Ghor-khurs*;) the hue of the upper-parts is only moderately diluted. Again, there is a much stronger tendency in the *Ghor-khur* for the white of the under-parts to extend upwards from the flanks, in some so much as to join that bordering the broad dorsal streak, and so insulating the isabelline hue of the haunch; and the zebra-markings of the limbs, common (though not invariably present) in the *Ghor-khur* have been denied to be ever traceable in the *Kyang*, and they certainly are not so in three skins of the latter under examination. In conformity with the general tendency to the extension of the white, as before remarked, that of the muzzle also reaches higher in the *Ghor-khur* than in either the *Kyang* or HEMIPPUS; and, lastly, the humeral cross, when apparent, shews itself differently, being faintly visible in full development and placed very forward in the *Kyang*, while in the *Ghor-khur*, when it does occur, it is a black cross more or less developed, though never probably to so great an extent as in the true Ass.

Moorcroft, alluding to the Quagga, remarks that the *Kyang* is “without stripes,” (evidently meaning such as the Quagga exhibits,) “except a reported one *along each side of the back* to the tail. *These* were distinctly seen in a foal, but were not distinguished in adults.”\* In the Society’s stuffed specimens, especially when viewed from some distance, the dull ruddy-brown or rufous-chestnut hue (approaching to bay, especially on the head,) of the upper-parts becomes gradually but distinctly darker on the flanks, to where it abruptly

\* ‘Travels in the Himalayan Provinces.’ I, 443.

contrasts with the white of the belly ; and in an adult the jowl and sides of the neck are white, reaching nearly up to the mane at the setting on of the head, whence the brown above gradually widens backward to the shoulder ; the white of the under-parts also ascends above the *elbow-joint*, and posterior to the very dull indication of the shoulder-cross, which is not darker than where the body hue contrasts with the white of the flanks. The stuffed foal is generally a trifle darker, and a little different in the relative extension of its shades ; the dorsal stripe being also less sharply defined, though only in consequence of the hair being longer. No doubt that individuals vary more or less, like individual *Ghor-khurs*.

Comparing the hoofs together, the only difference that I can perceive consists in the fact that the *Kyang* skins before me are those of *wild* animals, with the hoofs duly worn by constant action ; whereas those of a *Ghor-khur*, belonging formerly to a captive individual, are much less worn and accordingly are not so shapely. The limb-bones present no difference whatever. In the skulls, the only diversity that I can perceive may be fully accounted for by disparity of age. We have the skull of a mature female *Kyang*, with its last molars long in wear ; and this corresponds with Major Cunningham's figures of the skull of a male *Kyang*.\* With these I compare that of an adolescent male *Ghor-khur*, with the penultimate molars just coming into wear, the last being enclosed within their sockets, the two foremost deciduary præ-molars (on each side above and below) about to be replaced, and a medial pair of permanent incisors (above and below) just passing through the gums. A Horse at this stage of development would be reckoned as  $2\frac{1}{2}$  years old. At this particular age, I can perceive no further difference than can be accounted for by incomplete development on the part of the immature *Ghor-khur*.†

\* *Ladák, &c.*, pl. VI, p. 195.

† Since the above was in type, the Society has received from Major Lumsden, late in charge of the Kandahar mission, an imperfect skin and a skull of an adolescent male *Ghor-khur* from the vicinity of Kandahar. Its last molars were just coming into wear, corresponding to about four years old in the Horse. The skin shows the short summer vesture, and is of the same cream-colour or light isabelline hue as Major Tytler's three living specimens,—the true *desert colouring* ; and this hue suffuses the

Having thus elaborately compared them, it is impossible to agree with Dr. J. D. Hooker when he asserts that the *Kyang* "differs widely from the 'wild Ass' of Persia, Sindh, and Beluchistan," although "undoubtedly the same as the Siberian animal." He adds, that "it resembles the Ass more than the Horse, from its size, heavy head, small limbs, thin tail and the stripe over the shoulder [!]. The flesh is eaten and much liked. The *Kyang*-lah mountains are so named from their being a great resort of this creature."\* Trebeck's remarks on the figure of the *Kyang*, as quoted by Cunningham, apply alike to either race. The accomplished botanist cited would most assuredly not recognise, as distinct species, two plants from different regions which differed so very slightly from each other as the *Ghor-khur* and the *Kyang* differ in the animal kingdom. Indeed, so far as I can discover, the difference is only in

caudal region, which in Major Tytler's animals is conspicuously much whiter: the mesial dark line is very slight—almost evanescent—down the tail, in which respect all the *Ghor-khurs* differ from all the *Kyangs* under examination; and this stripe is not broader upon the croup than in an ordinary Donkey: there are no traces of markings on the limbs. The skull is unfortunately abnormal, being unsymmetrical and curiously deviating from the straight line, to the left at the occiput and to the right at the muzzle. The nasal bones are more compressed than in the *Kyang* skull; but this difference does not exist in Major Tytler's younger *Ghor-khur* skull, nor certainly in his three living animals, so far as a judgment can be formed on careful examination of them. There is an obvious deformity in the shape of the lower jaw, the *rami* of which approximate almost to contact underneath for a considerable portion of their length, and not quite symmetrically.

The only equine skull in the Calcutta Medical College is catalogued as that of a Horse; but it exhibits the true *asinine* contour, and is nearly as large as that of the adult *Kyang*. I do not think that it is a mule-skull; but rather that it belonged to a fine specimen of the large Levantine race of domestic Asses, which is occasionally met with in the N. W. of India, chiefly beyond Delhi. Had it been the skull of a wild animal, it would probably have been registered as such: and moreover, as a general rule, there is a considerable quantity of dark incrustation on the teeth of wild grazing animals, which I think is never much observable on those of domestic beasts: in the present instance, this is exhibited by the skull of a wild *Kyang* and that of a wild *Ghor-khur* under examination, and in no skull of domestic Horse or Ass, nor in the dubious Medical College specimen.

\* 'Himalayan Journal,' II, 172.

colouring, and this merely a difference of shades of hue and the relative extension of them!\*

As regards the geographical distribution of the *Kyang* or *Djiggetai*, it does not appear that aught has been added to our knowledge since the time of Pallas; and the same may be remarked of the distribution of the *Ghor-khur* or *Koulan*, excepting that the proper habitat of the HEMIPPUS has to be subtracted from that of the *Koulan*, and the supposed migratory habits of the latter are not confirmed by subsequent observation. In the depth of a Khiva winter, this animal was observed in numerous herds near the western extremity of Lake Aral by Major James Abbott, who remarks that he “ascended some high land covered with snow. Wind scarcely endurable. We every day see herds of wild Asses, and flocks of the Saiga Antelope. I counted 800 wild Asses in a single herd.”† According to Lieut. Irwin, it is “common in Persia, the western parts of Khorassân, and the plains of Turkistân, from which he extends north into the Russian dominions and the centre of Asia. A few are kept by the Ymacks more for curiosity than use.”‡ Southward, they are still numerous in the parched and rugged deserts of Beluchistân, which however are scarcely hotter than the country about the Aral in summer: there are many of them in the *Pât* or desert between Asni and the hills, west of the Indus, above Mithur-kote. “In this desert,” remarks a recent writer, “they are to be found wandering pretty well throughout the year; but in the early summer, when the grass and the water in the pools have dried up from the hot winds (which are here terrific), the greater number, if not all, of the *Ghor-khurs* migrate to the hills for grass and water. Some are probably to be found in

\* *Vide* a subsequent notice of the *Ghor-khur*, p. 240, where individuals are noticed of a very dark colour! But the *Dshiggetai*, as described by Pallas and Pennant, does not quite satisfactorily agree in colouring with the Tibetan *Kyang*! “Le poil est d’un jaune rembruni, assez clair. Le nez et l’intérieur des membres sont d’un jaune roux.” (Pallas, *Voyage*.) Pennant also, translating from the German, writes—“The colour of the upper-parts of the body a light yellowish-grey, growing paler towards the sides. *Butlocks white*, as are the inside of the limbs and belly.” This colouring really applies better to the *Ghor-khur*.

† ‘Narrative of a Journey from Herat to Khiva,’ &c. I, 23.

‡ J. A. S. VIII, 1008.

the hills throughout the year, for among them are sandy plains of greater or less extent. The foaling season is in June, July, and August; when the Beluchis ride down and catch numbers of foals, finding a ready sale in the cantonments for them, as they are taken down on speculation to Hindustan. They also shoot great numbers of full grown ones for food, the ground in places in the desert being very favorable for stalking. \* \* \* Some are beautifully striped on the legs; many are mottled. *I have seen one or two of a very dark colour.* They have not generally the stripe on the shoulder, though I think I have seen some with it slightly marked.\* Eastward of the Indus, this animal appears to be fast verging on extermination; and I am assured that one herd only is left in the Bikánir desert, where the foals are often run down, and Major Tytler's specimens are from this locality. There are still a few also in the Runn of Cutch.† “The wild Ass of Cutch and the north of Guzrât,” remarked Col. Sykes in 1835, “is not found further south in India than Deesa, on the banks of the Bunnas river in lat. about 23° 30'; nor have I heard of it to the eastward of the 75° of longitude on the southern side of the Himalaya. In Cutch and northern Guzrât it frequents the salt deserts and the open plains of the Opur, Jaysulmir, and Bikánir.” Again, Massou, in his ‘Narrative

\* *India Sporting Review*, n. s. III, 172.

† From information obtained by Major Tytler, it appears that the Bikánir herd consists at most of 150 individuals, which frequent an oasis a little elevated above the surrounding desert, and commanding an extensive view around; the animals being exceedingly shy, and making off on discerning an object of suspicion however distant. There is a low range of hills several miles off, in which is a water-course dry during the hot season; but at the head of this, about a mile into the interior of the hills, there is a perpetual spring to which the *Ghor-khurs* resort to drink during the night, maintaining the most vigilant caution. Once only in the year, when the foals are young, a party of five or six native hunters, mounted on hardy Sindh mares, chase down as many foals as they can succeed in tiring, which lie down when utterly fatigued and suffer themselves to be hound and carried off. In general they refuse sustenance at first, and about one-third only of those taken are reared; but these command high prices and find a ready sale with the native princes. The profits are shared by the party, who do not attempt a second chase in the same year, lest they should scare the herd from the district, as these men regard the sale of a few *Ghor-khurs* annually as a regular source of subsistence.



of a Journey to Kalât, (published in 1813), remarks that "the *Ghur-khor*, or 'wild Ass,' was formerly to be found on the Dasht Gúrân, and in Ghurgh'ina, but has disappeared of late years. It is still occasionally seen about Khárâu. It also ranges the plain of Dâlbânding, on the road from Núshké to Jálk. South-easterly of Kalât, it is said to be found on the Pât of Shikárpúr, between Tam-bú and Rojân."

To the west of the range of the *Ghor-khur* lies that of *ASINUS HEMIPPUS*, or true *Hemionus* of ancient writers,—the particular species apostrophized in the book of Job, and again that noticed by Xenophon. There is a recent account of it by Dr. A. H. Layard, in 'Nineveh and its Remains' (324). Returning from the Sinjar, he was riding through the desert to Tel Afer, and there he mistook a troop of them for a body of Horse, with the Bedouin riders concealed! "The reader will remember," he adds, "that Xenophon mentions these beautiful animals, which he must have seen during his march over these very plains. He faithfully describes the country, and the quadrupeds and birds that inhabit it, as they are to this day, except that the Ostrich is not now to be found so far north.\* 'The country,' says he, 'was a plain throughout as even as the sea, and full of wormwood; if any other kind of shrubs or reeds grew there, they had all an aromatic smell; but no trees appeared. Of wild creatures, the most numerous were wild Asses, and not a few Ostriches, besides Bustards, and Red Deer (Gazelles), which our horsemen sometimes chased. The Asses, when they were pursued,

\* According to Chesney, Ostriches are still "found in the great Syrian desert, especially in the plain extending from the Haouran towards Jebel Shammar and Nedja: some of them are found in the Haouran itself; and a few are taken almost every year, even within two days' journey of Damascus," &c. (*Journal of Euphrates Expedition*, I, 558.) It is well known that Ostriches commonly accompany, at the present day, the troops of Quaggas and of Duws in S. Africa.

The remnant of the Ostrich race in Syria requires close examination. From some eggs in Major Tytler's possession, I am strongly inclined to suspect a second species of Ostrich. These eggs are smaller than the ordinary Ostrich egg, and have a much smoother and more polished surface, with the pores scarcely perceptible. In the ordinary Ostrich egg, the pores are particularly conspicuous.

Ostrich feathers, whithersoever obtained, are numerous among the Kurds, who adorn their spears with them.



having gained ground on the Horses, stood still (for they exceeded them much in speed); and when these came up with them, they did the same thing again; so that our horsemen could take them by no other means than by dividing themselves into relays, and succeeding one another in the chace. The flesh of those that were taken was like that of Red Deer, but more tender.' (*Anab. l. 1 c. 5.*) In fleetness," continues Dr. Layard, "they equal the Gazelle; and to overtake them is a feat which only one or two of the most celebrated mares have been known to accomplish. The Arabs sometimes catch the foals during the spring, and bring them up with milk in their tents. They are of a light fawn-colour—almost pink. The Arabs still eat their flesh." This will of course be the animal seen by Mr. Ainsworth at the foot of Taurus, and observed by him among the lower hills.\*

It cannot be doubted that this *ASINUS HEMIPPUS* is the Mesopotamian and Arabian 'wild Horse' of Col. Chesney, as distinguished from his 'wild Ass' of the southern deserts of Arabia. In Mesopotamia, this author remarks—"We did not obtain a single specimen, although the Arabs engaged to bring one: they brought a skin, however, of a light brown colour, without stripes, and having a mane [! dark streak?] all along its back. This is more probably the wild Horse." !!! Again, treating on the animals of Arabia, he remarks—"The wild Horse, the wild Dog [? *LYCAON PICTUS*?], and a kind of wild Cow [*ORYX BEATRICIS* (?), Gray], inhabit the country adjoining the district of Joff, between Tolink Sanou and Kedrush; and to the south of these places the wild Ass [*ASINUS VULGARIS*?] is found in great numbers. The Sherarát Arabs hunt them, and eat their flesh, but not before strangers." Elsewhere he remarks that—"The Ass is probably the original animal of its kind [*i. e. species domesticated*?] in the country; for it is first mentioned in connexion with this part of the world (*Gen. xii, 16, Exod. iv. 20*), and it was afterwards considered as a royal animal."† Here

\* 'Travels in Assyria, Babylonia, and Chaldea,' p. III.

† Col. C. H. Smith remarks that the Ass is "repeatedly mentioned in the Pentateuch before the Horse is noticed, such as, in the sacrifice of Abraham; in his visit to Egypt, where he received presents from Abimelech; and in the spoils of Shechem, where Asses are mentioned with other cattle, but the Horse is not men-

at least two species are indicated, which are likely to be the *ASINUS HEMIPPUS* and genuine *A. VULGARIS* in its aboriginally wild state; and the wild Asses of the island of Socotra may be presumed to be no other than the latter. They are noticed by the late Lieut. Wellsted, R. N., who remarks—"Amidst the hills over Tamarida, and upon the plain contiguous to it, there are a great number of Asses, which were described to me as different from the domestic Ass; but after repeated opportunities of observing them, I could find no reason for such a distinction. The introduction of Camels," he remarks, "having superseded the necessity of employing them as beasts of burthen, they are permitted to stray where they please, and now wander about in troops of ten or twelve, evincing little fear unless approached very near, when they dart away with much rapidity." It is more likely that they are truly aboriginal.

The genuine wild Ass would, however, appear to be chiefly an inhabitant of N. E. Africa, where considerable troops of these animals still exist, as described by ancient authors; and being of pre-historical antiquity, it does not appear upon what grounds the late Prince of Canino pronounced them to be the descendants of domestic Donkeys, like those (for certain) in the hotter parts only of America: for it may be remarked that it is only in a hot climate that the Ass has returned to wildness,\* and the domestic Ass is said to thrive only in a warm climate, and to be reared with difficulty even in Norway. To this subject, however, I propose to return in the sequel.

Whether or not inhabiting the southern parts of the peninsula of Arabia (which our friends at Aden should endeavour to ascertain.) The Horse is supposed to have been introduced into Egypt by the *Hyksos*. In Assyria it was reclaimed at the period of the oldest monuments, as abundantly demonstrated by the discoveries of Layard and others—since Col. Smith wrote.

\* Azara notices, of those which have gone wild in South America, and especially about Santa Fé de la Vera Cruz, where he states that the increasing population was fast destroying them (and may have done so by this time), that those which he saw "appeared to be somewhat larger than the domestic Asses of Paraguay, but smaller than the common Asses of Spain; nor does that large race," he adds, "which is there used for the breeding of mules, exist in these parts. They also appear to have larger and stiffer ears than in my native country."

tain) and also the island of Socotra, it is quite certain\* that great troops of wild Asses, properly so called, exist not only in the sandy deserts but upon the mountains of N. E. Africa. And it appears that a specimen was not long ago added to the Paris Museum, and was there designated "l'Onagre d'Abyssinie:" it was presented by M. Degoutin, French Consul at Massoua, and (remarks Professor Isidore St. Hilaire) "est certainement un Ane sauvage." It belonged, he tells us, to one of those troops which wander about the deserts of N. E. Africa, the existence of which was long ago indicated by Ælian, and which are mentioned also by Leo Africanus in the sixteenth century, and by Marmol in the eighteenth century.

"The wild Ass, remarks the latter author, is grey. There are a number of them in the deserts of Lybia, Numidia, and the neighbouring countries. Their pace is so fleet, that only a Barb can come up with them. In our days," continues M. St. Hilaire, "these troops have been met with in various localities by different travellers; among others, by M. Caillaud, in Nubia; and to all the testimony already published, may be added 'trois documents inédits,' respectively by M. Botta (formerly travelling naturalist for the Paris museum and now Consul at Jerusalem), by M. Trémaux (architect), and by M. Gouzillot (Coptic Patriarch in Abyssinia).

"The first observed, in Sennaar, a multitude of wild Asses in troops, which were very distinct, according to the spoils obtained, from other animals designated wild Horses [A. HEMIPPUS?], which inhabit the opposite coast of the Red Sea, in Arabia. The second, in 1848, remarked them in the desert of Naga, in Nubia: their coat was of a palish grey, and the ears were longer than those of the Hemione [A. HEMIPPUS?], but shorter than in the tame Ass [?]. Lastly, M. Gouzillot, who passed six years in Abyssinia, has assured us of the existence of Onagers in countless herds on the mountains."

These are of course the wild Asses noticed by Col. C. Hamilton Smith, as occurring "on the Nile, above the cataracts; and abundant on the upland plains, between the table-hills below Gous Regun and the Baber-el-Abiad, in Atbara. (*Vide* 'Voyage on the Baber-el-Abiad,' by Adolph, Linaud, and Hoskins's 'Travels in Ethio-

\* *Jour. Roy. Geogr. Soc.* 1835, p. 202.

pia.}') According also to Sir J. Gardner Wilkinson, they are "common in the districts of the Thebaid."\* Hoskins met with them in the small desert immediately below the fifth cataract. "This desert," he remarks, "is sandy, with quartz and flinty slate disseminated. We saw for the first time three wild Asses, which had been browsing among the acacias near the Nile. There are great numbers of them in the country; but the peasants very seldom succeed in catching or destroying them. A mixed breed [!] is sometimes seen in the villages. From the description of the Arabs, I conceive that the Zebra [A. BURCHELLII], also, exists in these deserts. The Nile Ass seems larger than the common one; but we were at too great a distance to observe them particularly. The peasants seldom chase them, but with a good Horse it is not very difficult."†

Both "wild Asses" and "Zebras" are noticed by Mr. W. C. Kirk, in his 'Report on the Route from Tajurra to Ankobar.'‡ Ruppell has determined this northern Zebra to be the A. BURCHELLII, or Dauw of the Cape colonists,—the *Equus zebra* of Burchell, as distinguished from his *E. montanus*,—and undoubtedly the true *Hippotigris* of the ancients, if not also the original 'Zebra' of Pigafetta from Congo :§ the *wild-Paard* of the Dutch colonists, or 'Mountain Zebra' of Burchell, being the EQUUS or ASINUS ZEBRA of modern technical nomenclature. This I mention, because the French zoologists, from Cuvier to M. Isidore St. Hilaire,|| persist in the mistake of identifying the "Zebra de montaigne" with the Dauw or A. BURCHELLII.

Bruce notices "Zebras" as being "found in Abyssinia only in the south-west extremity of Kuora amid the Shangalla and Galla, in Narea and Caff, and in the mountains of Dyre and Tegla, and thence to the southward."—"Wild Asses," too, he remarks, "I

\* 'Domestic Manners of the Ancient Egyptians,' III, 21.

† 'Travels in Ethiopia,' p. 41.

‡ *Journ. Roy. Geogr. Soc.* XII, 234; and for another notice of an African wild Ass, *ibid.* X, 461. In the narrative of Lander's expedition (p. 571), a "wild Ass," is mentioned, whatever this may refer to.

§ Col. C. H. Smith considers this northern 'Zebra' to be distinct, and styles it *Hippotigris antiquorum*; but I think on very insufficient evidence.

|| *Comptes Rendus*, 1855, p. 1215.

have frequently seen alive, but never dead : in neck, head, face, and tail, very like ours, *only their skins are streaked*, not spotted!" Perhaps he alludes to occasional bars on the limbs, like the wavy lines on those of the *Ghor-khur* which Bell seems also to refer to. The wild Ass of N. Africa is not mentioned in Dr. Barth's work ; but at the Meeting of the British Association for 1858, Mr. R. Schlagintweit made some remarks relative to the *Ghor-khur* (as reported in the *Athenæum*), and stated that Dr. Barth had lately told him, that, according to the description which he (Mr. R. Schlagintweit) had given him, "he thinks the Asses which he saw in Africa identical with the *Ghor-khurs* of Sindh and Beluchistan." This can hardly be ; and does the following notice refer to the ordinary wild Ass of N. E. Africa ? I very strongly suspect otherwise. Col. C. H. Smith remarks—"We have seen a pair of these animals brought from Cádiz ; they were equal in size to an ordinary mule, neatly if not elegantly formed, *white* in colour, but silvery-grey on the ridge of the back and nose, with the forehead, neck, and sides of a beautiful pale ash with a tinge of purple, the mane, tail, and cruciform streak black."\*

These I take to be choice specimens of the fine Levantine breed of domestic Asses, such as are often represented in antique Egyptian paintings, and always with the black crucial mark. From the remotest times, it seems that two races of domestic Asses were known in Egypt, and both are represented in the old paintings. In modern times, Russell (in his 'Natural History of Aleppo,' p. 58,) remarks, that the Levantine nations have two principal breeds of Asses ; "one very large, with remarkably long ears ; the other small, and much like ours in England." Chardin, again, tells us, that there are two races of the domestic Ass in Persia : "Les Anes du pais, qui sont lents et pesans, comme les Anes de nos pais, dont ils ne se servent qu'à porter des fardeaux ; et une race d'Anes d'Arabie, qui sont de fort jolies bêtes, et les premiers Anes du monde. Ils ont le poil poli, la tête haute, les pieds légers, les levants avec action en marchant. L'on ne s'en sert que pour montures : les selles qu'on leur met sont comme des bâts ronds, et plats hardessus, faites des drap ou de tapisserie, avec les étriers et le harnois. On s'assied

\* Naturalist's Library, 'XII, 312.



dessus plus vers la croupe que vers le cou. On met à plusieurs des harnois tout argent, tant le maître est content de la légèreté et de la douceur de leur allure. Il y eu a du prix de quatre-cens francs, et l'on n'en sauroit avoir d'un peu bons a moins de vingt-cinq pistoles. On les pense comme les chevaux. Les ecclésiastiques d'qui ne sont pas encore dans les charges, ou dans les grands Bénéfices, affectent à aller montés sur les Anes." He then proceeds to explain how these fine Asses are taught to amble.

The large and small races of Levantine Asses may be said to bear somewhat of the same mutual relation as Horses and Ponies. The small kind only have become domesticated in Northern Europe; and we trace them southward into Dârfur, where they are thus described in Mr. G. Brown's Travels in that country (1799).—"The Ass here is of the same appearance and of the same indocile nature, as that of Great Britain. The only good ones are what the Jelahs bring with them from Egypt: yet the animal is much used for riding; indeed few persons mount a Horse but the military, and those who are in immediate attendance at Court. An Egyptian Ass fetches from the value of one to that of three slaves, according to the weight he is able to bear. A slave will purchase three or four of the ordinary breed; and yet the people are not anxious to improve them."

The Asses of Upper Egypt, according to Soumei, are particularly handsome, but they degenerate towards the Delta. Fraser states, that the Asses of Omân are the best in Arabia, and individuals of the best breeds sell for extravagant prices.\* In Munro's *Syria*, we are told that the Asses of Damascus stand fourteen hands high; and elsewhere he remarks of one of them:—"This Ass was the finest of the kind I ever saw, and the guide asserted that he would sell for more than both his own Horses. With all the animation and temper of a Horse, he had the superior qualification of being quicker and easier in his walk."—"This Ass was found, after a long journey, to refuse his food. On visiting him, after supper, I found

\* I have somewhere read that the pedigrees of the best Asses of Omân are kept with as much care as those of the choicest breeds of Horses in the same province.



that the Ass was not eating, and seemed out of spirits. The guide accounted for this by saying, that he was in the habit of living in the house with his master, and that he was alarmed at being left in the dark by himself; wherefore I ordered him into the shed, and his supper being placed near the fire, he fell upon it with great avidity; and had no sooner finished, than he claimed a right to belong to the society, by lying down amongst us, to my great amusement, and the infinite chagrin of my companions, who would have turned him out but for my interference. During the night he became restless, and got up in order to lie down on his other side; in doing which he interfered with the guide's legs, whom I found abusing him for being a pig and an infidel, and threatening to spit on his beard."

In Irwin's 'Memoir of Afghánistán,' we are informed that "the Ass gradually improves as we proceed westward from the Company's provinces. Perhaps the best are those from the west of Khorassán, but even these are much inferior to the Arabiau or the Spanish. Asses are imported from Kábul into Bokhára, and the north-west of Turkistán." Buckingham tells us, that "one of the peculiarities of Bághdád is its race of white Asses, which, as at Cáiro, are saddled and bridled for the conveyance of passengers from one part of the town to another; and these are equally as large and spirited as the Egyptian Ass, and have as easy and speedy a pace. They are frequently spotted over with colours, and otherwise fantastically marked over with red henna-stains." This barbarism, it need not be told to Indian readers, is commonly practised on Horses in this country.

At Pesháwar, tame Asses of the large race are known as 'Bokhára Asses'; and Sir A. Burnes, writing on the domestic animals of Bokhára, remarks—"none are more useful than the Ass; the breed is large and sturdy, and they are much used—both for saddle and bridle. There is no objection to riding them, as in India. There are no mules, from a religious prejudice against them." His brother, Dr. A. Burnes, also remarks that—"Asses, much larger than those of India, are to be met with in Sindh, where the Ass attains the development which it is known to enjoy only within a very limited geographical distribution." But are not these five Asses chiefly

imported into Sindh, rather than bred there? Albeit the climate should well agree with them. A correspondent informs me, that "what are called Bokhára Asses are frequently brought to Pesháwar. They are very large and strong, and are both of the usual colour and white. Of the latter, a friend of mine had three, viz. a male and female, and their offspring. There was one of the usual colour, larger than either of the two white ones, and I have some idea that I had heard it said that he was over thirteen hands high; but of this I will not be positive, having paid no great attention. I think they were not at all uncommon at Pesháwar when the Káfilas were getting through, and, as far as I remember, the price asked for one was from 80 to 150 rupees. As for where they came from, that I don't know in particular, except that they came with the Káfilas of Horses from the north. The dark one I have mentioned was an extremely fine specimen; but my friend got him for (I think) 80 rupees, to use as a baggage Donkey, and as far as I recollect he was sold cheap, because he declined to act as a stallion to *mares*, and was therefore useless for the purpose of begetting mules." It would appear, accordingly, that these fine Asses are foreign to Sindh, and are mostly brought for the purpose of procreating mules; in which case she-Asses of the kind are probably scarcely known there, and consequently the race can hardly be said to be introduced into the country. It would nevertheless appear to be completely naturalized in Bokhára.

These superb Asses are bred and duly estimated in America; and it is time that they were introduced into the Australian colonies, if not also those of S. Africa. In Capt. Marryatt's well known 'Diary in America,' the novelist describes a cattle-shew which he attended in Lexington, Kentucky. The fourth day of the shew was reserved for the exhibition of Asses. "Several were shewn standing fifteen hands high, with head and ears in proportion: the breed has been obtained from the Maltese Ass, crossed by those of Spain and the south of France. Those imported, seldom average more than fourteen hands high; but the Kentuckians, by great attention and care, have raised them up to fifteen hands, and sometimes even to sixteen. The prices paid for these splendid animals, for such they really are, will prove how much they were in request.

One male, of great celebrity, sold for 5,000 dollars, upwards of £1,000 sterling. A half share of another male was sold for 2,500 dollars. At the shew I asked the price of a very beautiful female Ass, only one year old; the owner said that he could have 1000 dollars for her, but that he had refused that sum. For a three year old male, shewn during the exhibition, 3,000 dollars (more than £600) were refused. The fact is that mule-breeding is so lucrative, that there is no price which a very large Donkey will not command."

With reference to the current statement, that the Ass nowhere thrives in a cold climate, it should be remembered that these animals are numerous in Pekin; and that some at least of the Chinese Donkeys are fine animals, may be inferred from Dr. Hooker's remark about the Tibetan mules, which, he says, are often as fine as the Spanish. He "rode one, which had performed a journey from Choombi to Lhasa in fifteen days with a man and load." Nevertheless, as a general rule and irrespective of recent introductions, the finest Asses chiefly inhabit Arabia and the Levantine countries, and the most degenerate are the puny cat-hammed *Guddhas* of India generally. As Col. Sykes remarks, some of these are scarcely larger than a fine Newfoundland Dog; but on what ground Col. C. H. Smith supposed this to be a wild race inhabiting the Dukhun,\* it is difficult to imagine. There are small Asses also in Persia, as about Ispahán, what Chardin (as we have seen) denominated the race proper to the country; while he mentions that many of the large kind are imported into Persia from Arabia. It is curious that Aristotle states, that in his time there were no Asses in Pontus, Syria, or in the country of the Celts (meaning modern Germany and France); Syria being now so celebrated for the excellence of its breed of them. For many ages previously they are known to have existed in Egypt and Arabia. In short, there seems to be no evidence whatever to bear out the current notion that the domestic Ass originated in northern Asia; but, on the contrary, every reason to infer that it originated in the region where the particular species is still found wild, and where also the finest and least altered of the domestic races prevail to this day; and that the fact should not have been long ago established, is surely somewhat remarkable.

\* *Nat. Libr. Mammalia*, Vol. XII, 306.

A writer on this animal observes, justly enough, that—"The Ass is, properly speaking, a mountain species; his hoofs are long, and furnished with extremely sharp rims, leaving a hollow in the centre, by which means he is enabled to tread with more security on the steep and slippery sides of precipices. The hoof of the Horse, on the contrary, is round and nearly flat underneath, and we accordingly find that he is more serviceable in level countries; and indeed experience has long since taught, that he is altogether unfit for crossing rocky and steep mountains." Hill ponies may, indeed, be cited as exceptions, to a greater or less extent: but the fact is nevertheless true in the main; and hence the breeding of mules in mountainous countries, which should combine the size and strength of one parent species with the hardihood and sure-footedness of the other. All of the Asinine tribe seem to be quite indifferent to heat, and some (at least) of them are equally so to cold, as especially exemplified by the *Koulans* or *Ghor-khurs* about Lake Aral; and the tame Asses of this country, under the fiercest mid-day sun, may commonly be observed to evince their innate fondness for the parched desert, as strongly as a kid manifests its propensity to clamber rocks, by keeping to the dusty roads, in preference to the pasture, whenever they are not feeding. Of several species so very nearly akin, in different countries, it is remarkable that only the Ass should have been subjected to servitude (save in a few individual cases at most); but it appears that the experiments which have been systematically carried on, now for several years, by the Acclimation Society at Paris, have been attended with considerable success in breaking in *Ghor-khurs*, which have been bred there for a series of generations, and that these animals are now daily mounted and ridden. Many years ago, the celebrated Sheriff Perkins drove a pair of Quaggas through the streets of London, as I well remember to have witnessed when a child.

The following species of the division *ASINUS*, as defined by Gray, are now likely to be generally acknowledged.

1. *A. QUAGGA*. The Quagga, from the Cape territories; and scarcely found northward of the Gariep or Orango river; but still in great herds southward, associating with the White-tailed Gnu, as the next does with the Brindled Gnu, and both with Ostriches (as in Xenophon's

time the *A. HEMIPPUS* did in Mesopotamia). The most Horse-like in structure of any. The *Hippotigris isabellinus* of Col. C. H. Smith is probably founded on a Quagga-foal, perhaps not very exactly represented. Such an animal as this, or as the 'Isabelline Zebra' of Levaillant, could not have been overlooked by all subsequent explorers of S. Africa.

2. *A. BURCHELLII*, Gray; *Equus zebra* of Burchell. The *Dauw*, or original *Hippotigris* of the ancients, and also the original *Zebra* of Pigafetta from Congo; but unknown to Buffon, who regarded the next or Mountain Zebra and the Quagga as the two sexes of one species, denominated by him the Zebra: *Hippotigris Burchellii* et *H. antiquorum* of C. H. Smith. Extensively diffused over Africa, even to Abyssinia and to Congo, and southward to the Gariep river.\*

3. *A. ZEBRA*: *Equus montanus*, Burchell. The Zebra of modern nomenclature, or (more distinctively) the Mountain Zebra; *Wild Paard* ('Wild Horse') of the Dutch colonists of S. Africa. A thorough mountaineer, and known only to inhabit S. Africa. Also the most completely striped of any, down to the very hoofs.

4. *A. VULGARIS*, Gray: *E. asinus*, L. The true *Onager*, *Onagerus*, or aboriginally wild Ass; indigenous to N. E. Africa, if not also to the southern parts of Arabia and island of Socotra.

5. *A. HEMIPPUS*: *E. hemippus*, Is. St. Hilaire; *E. asinus onager* apud Wagner. The *Hemionus* vel *Hemippus* of the ancients; inhabiting the deserts of Syria, Mesopotamia, and the northern parts of Arabia.

6. *A. ONAGER*: *E. asinus onager*, Pallas. The Koulan or Ghor-khur inhabits W. Asia, from 48° N. latitude southward to Persia, Beluchistan, and W. India.

7. *A. HEMIONUS*; *E. hemionus*, Pallas: *E. kyang*, Moorcroft; *E. polyodon*, Hodgson. The Dshiggetai or Kyang. Inhabits Tibet, and thence northward through the Gobi desert into Mongolia and southern Siberia.

*N. B.*—So far as known for certain, the last two are distinguishable by shades of colour only, and by unimportant differences in the relative extension of different hues and markings. The *A. hamar*

\* To this species appertained the 'Zebra' lately subjected by Mr. Rarey.



of Col. C. H. Smith is rejected, as having been founded on insufficient evidence of the existence of such an animal.

It is highly improbable, also, that other wild asinine species yet remain to be distinguished.

To recapitulate, I have endeavoured in this paper to establish the following novel propositions.

1. That the true *Onager* and *Hemionus* of ancient writers were unknown to Pallas, who has assigned those names to cognate species or races that were unknown to the Greeks and Romans.

2. That, accordingly, the *Koulan* of N. Asia is not the true *Onager* or aboriginal wild Ass, but that it is identical with the Indian *Ghor-khur*.

3. That the true *Onager* or wild Ass is not an inhabitant of N. Asia, but of N. E. Africa and the southern portion of Arabia.

4. That the *Koulan* and the *Dshiggetai* or *Kyang*, instead of being strongly distinguished apart, as has been asserted, bear so exceedingly close a resemblance that no decided specific distinction has yet been satisfactorily pointed out, however probable that such distinction may exist.

Why, therefore, the one should be popularly styled a 'wild Horse,' and the other a 'wild Ass,' is difficult to comprehend. Even Pallas terms the *Dshiggetai* "un Cheval sauvage," though describing it as "ni Cheval ni Ane,"—while the other he both designates as the Ass of the steppes and as the "Cheval ou Ane," employing the word 'Cheval' in its German equivalent evidently in the sense of EQUUS. Col. Chesney, as we have seen, terms the Arabian A. HEMIPPUS a 'wild Horse,' as distinguished from his wild Ass of S. Arabia! The fact is, I apprehend, that the vague application of these names has resulted merely from the colouring.

*April 18th, 1859.*

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PROCEEDINGS  
OF THE  
ASIATIC SOCIETY OF BENGAL,  
FOR JUNE, 1859.

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The Monthly General Meeting of the Asiatic Society of Bengal was held on the 1st Instant.

A. Grote, Esq., President, in the Chair.

The proceedings of the last meeting were read and confirmed.

*Presentations were received.*

1. From Lieut.-Col. James Abbott, through W. H. Fergusson, Esq., two boxes of ancient copper coins.

2. From Major Berdmore, Schue Gyen, on the Sitang River, Tenasserim Provinces, a collection of reptiles and fishes, chiefly the latter, obtained mostly from the hills in the interior, and comprising some new generic forms of much interest, with several new species belonging to other mountain forms of India.

3. From Capt. Hodge, through A. Grote, Esq., a bottle of specimens preserved in spirits from Port Blair.

4. From the Home Department, Nos. 53 A and 55, of the Selections from the records of the Madras Government.

5. From Dr. E. Roer and W. A. Montriou, Esq., copy of a work on Hindu Law and Judicature from the Dharma Sastra of Yajuavalkya.

6. From F. E. Hall, Esq., M. A., a work entitled "A Contribution towards an Index to the Bibliography of the Indian Philosophical Systems."

Major R. Tytler, duly proposed at the last meeting, was balloted for and elected an ordinary member.

R. H. M. Warrand, Esq., B. C. S., proposed by Mr. Atkinson, seconded by Mr. Grote, was named for ballot at the next meeting.

*Communications were received.*

1. From G. H. Freeling, Esq., An account of Pergunnah Mahoba, Zillah Hameerpore, Bundelkund.

2. The following extract from a letter dated Aden, April 16, 1859, addressed to Mr. Blyth by Captain Speke, who has lately returned with Capt. Burton from an exploring journey in the East of Africa :

“ At last we have returned from our African exploration and I think with tolerable success, considering all things. Starting from just opposite Zanzibar we travelled over flattish cultivated and tree-clad ground, following up the Kinjani river to the Eastern Ghants of Africa about 100 miles from the Sea. Thence we ascended from 250 feet and crossed over the mountain belts, averaging from 2000 to 6,000 feet each, until the great central plateau was reached. These hills are chiefly composed of granite and are very sparsely populated excepting in some few favoured places. Their breadth is about 2 degrees. Still travelling Westward on the parallel of Zanzibar, the track extends about 6 degrees over a continuous plateau, dotted, and in some places striped, with small hills, outcrops of granite, until the great and extraordinarily depressed Lake Tanganzika is reached. This is a lovely piece of water surrounded on the Northern half, where we visited it, by a nest of hills higher to the north, and gradually drooping towards the South, thickly studded with a population of boisterous habits. The water level is only 1,800 feet or about half the height of the plateau. Some of the fishes are excellent. I have brought away some specimens of shells. There is but a limited variety of them. The Lake water is very sweet and good.

“ On returning from the Tanganzika Lake I left my companion (who had been almost in a bed-ridden state from the beginning of the journey) at a place called Unzunzember, Lat. 5° S. and Long. 33° E., and went due North up the plateau to 2° S. There I discovered the water of waters, the Nyanza Lake, a broad expansive sheet at an elevation of 3800 feet, extending *certainly* 5° or 6° to the northward and about 90 miles broad. The waters are delicious and are said to contain a great variety of fish. The whole of its southern extremity is thickly populated, thickly catted, and thickly

cultivated. Iron is found in great abundance, and a little north of the Line coffee is grown to any extent. By my observations and from the inability to get any information of a termination to the Lake northwards, coupled with a story generally known amongst the Somali of Aden that a large sheet of water exists to the westward of their country, there remains in my mind little doubt but that I have discovered the true source of the Nile. How I long to go back there and finish the work begun by a Bengali. Cotton and rice grow very well over the plateau, but the people are too inert to make any good of it. Frankincense and other gums are abundant in places. The people of inner Africa are generally speaking mild savages. I was very much disgusted with the great paucity of game, and animal life generally is not at all what I expected to see. As my companion had a handy servant who could shoot, and stuff too after I taught him, I did not interfere in the zoological department but left it to him.

“Perhaps you remember taking me to the Surveyor General’s, where I showed him my maiden map, a sketch of little Thibet, drawn with the aid of a common compass, and a five pound watch. I have now done all the mapping in Africa, that has been my especial province, but this time I have done it astronomically.”

3. The following letter addressed to the Secretary, Mr. Atkinson, from Dr. W. Haidinger of the Imperial Museum of Geology and Mineralogy in Vienna.

MY DEAR SIR,—I beg leave to address you like an old correspondent, though it be the first letter I write you. I should observe however that it is already the second, the first official one having been sent along with the new numbers of our “*Jahrbuch*” for the Asiatic Society of Bengal, along with the acknowledgment of the receipt of that most welcome and highly valuable set of publications, you kindly sent over to us through Messrs. Williams and Norgate, and which came safely to our hands. But I wish to propose to you and the Museum of the Society in the name of our Imperial Museum of Mineralogy, a measure of exchange which I trust, as well as Dr. Hörnes, Director of that Museum, may be advantageous both to our Museum and to the one under your charge. I enclose in the first place the list of meteorites and meteoric irons in our

Imperial Vienna Collection. If you compare it with Mr. H. Piddington's Catalogue of the Meteorites preserved in the Museum of the Asiatic Society, published in 1844, Vol. XIII. No. CLV., N. S. 71, page 885, you will find that we possess none at all of those mentioned in your Catalogue, and that in your Catalogue also none is mentioned of those preserved in ours, if we except the Pallas iron of Siberia and the Moruay Iron of Sergipe in your Catalogue, which are the same as No. 94, Krasnojarsk, and No. 104, Bahia, of ours. Now we propose a fair exchange. Probably since 1st of January, 1845, your collection may have been considerably enlarged. I would therefore be very much obliged to you in the first place, if you would kindly communicate to me a catalogue of the Meteorites and Meteoric iron, at present in your Museum. To state the *number* and *weight* of specimens, would be most interesting in this catalogue. Then we should be obliged, and very much obliged indeed, for your communicating to us specimens, either fragments or entire masses, where you possess several of the same fall. If in some case or other there should not have been any chemical analysis published, I should be most happy not only to give a new description of the Meteoric stone or iron mass, but also to get an excellent new analysis performed. I should be particularly happy, to receive from you any information, additional to what is published in your journal respecting the fall or other history of the specimens.

The box containing the specimens might be sent with the Overland Mail, directed to "Kaiserlich-Konigliche Geologische Reichsanstalt Wien" with the declaration "Mineralogical Specimens." If you would send specimens for examination, like for instance No. 4 of the Meteoric Irons, the Fulgur Stone of Nepal, "not examined, perhaps meteoric" I should be glad to undertake the examination, and then return the specimen, if you did not entitle me to keep perhaps a portion of it for our own collection of Meteorites. I should be glad also to get a portion of your Kurruckpore iron. But there is the difficulty of cutting off a portion of it. It never should be treated with a hammer. This spoils the structure altogether. I should advise you to get a portion sawed off in the direction here indicated making use of a steel scesaw without teeth, and

emery. With all that however it is a hard job, and a cut of perhaps five inches in every direction will take a continued work of perhaps six weeks, the meteoric irons being exceedingly tough. If you were to cut off in that way a lump of, say, ten or twelve pounds and send it over, we might have it cut afterwards in smaller specimens here, if you would send specimens also to one or another Museum in Europe.

Now I have said a great deal about what we wish you should do. But I must also say what we are ready to offer you as a fair exchange. The Imperial Vienna Museum would send you specimens of meteorites new to your cabinet or museum of several localities, of which there are duplicates, and there are such of a good many of them. If you should fix upon some one or other of them, we should do our best to have your wishes executed. I suppose the greater part of your Museum will have remained in the possession of the Society. Some Meteorites may be however also in the possession of the Museum of practical Geology, and I write also on behalf of the Meteorites to Mr. Oldham. I should be most happy to hear soon of your acceding to my proposition. I should have added, that on account of your most valuable present, we have entered on the list of our correspondents, your own honored name, as also that of the President, Hon'ble Sir James Colvile, Vice-Presidents—Baboo Ramgopaul Ghose, A. Grote, Esq., Lieutenant-Colonel R. Strachey,—H. Piddington, Esq., E. B. Cowell, Esq., Baboo Rajendralal Mittra, Baboo Gour Doss Bysack; the writs of notification of which have been accluded to the package of our last numbers.

I have the honor, &c.,

(Sd.) W. HAIDINGER.

W. S. ATKINSON, Esq.,

*Secy., Asiatic Society of Bengal.*

With reference to this letter, the Council announced that they had appointed a Committee consisting of Mr. Oldham, Dr. Thomson, and Mr. Atkinson, to examine the meteorites in the Society's collections, and to report how far it was possible or desirable to comply with M. Haidinger's request. The Committee had presented a report which the Council had adopted, and they now requested authority to carry out the recommendations contained in it.



The report was as follows :—

Your Committee have taken the proposition conveyed in Dr. Haidinger's letter to the Secretary, into careful consideration, and beg to report on the question referred to them as follows.

It appears to your Committee highly desirable that the Asiatic Society of Bengal should, to the utmost of their power, reciprocate the friendly feeling and desire for co-operation evinced by the Imperial Cabinet of Mineralogy at Vienna. The collection of Meteorites in that establishment has for years past had a world-wide reputation, as being the most complete and valuable in existence, and has been long known to investigators of such interesting specimens by the valuable descriptions, &c. of Herr Partsch. Under the able superintendence of Dr. Hörnes this collection is steadily increasing in number. Your Committee think it not only a duty to endeavour to contribute towards bringing such a collection more nearly to completeness, but that the Society will also feel a pleasure in adding to so numerous and valuable a series which amounts at the present time to 137 varieties.

Under these impressions your Committee have carefully gone over all the specimens now in the possession of the Society. On the 1st January, 1845, Mr. Piddington gave a list of those at that time in the Society's collections, amounting altogether to 10 (Jour. As. Society Bengal Vol. XIII. p. 885.) One of these, the so-called Lightning stone of Nepal ("not examined, but may be meteoric" as described by Mr. Piddington) your Committee have agreed in thinking decidedly *not* meteoric. It is a fragment of stone very similar to those so well known in Great Britain, Norway, &c. to collectors of antiquities, as celts (or commonly called thunderbolts) or of a fulminating stone used by weavers for the preparation of their cloth.

To the number as given by Mr. Piddington in 1845 six varieties have since been added. A complete list therefore of those now in the possession of the Society would be as follows.

No. 1. Fell at Moradabad in 1808, procured from Captain Herring, 3 fragments. The total weight of these fragments is 2½ ounces.

No. 2. Aerolite which fell at Allahabad, sent by Dr. Tytler, of this there are three pieces of good size.



	lb.	oz.
Weighing	3	8½
	4	3
	1	4½
	<hr/>	
Total	9	0

No. 3. Aerolite which fell about 40 miles to the west of Umbala between the Jumna and Punjab in 1832-3, obtained by Captain Murray; given by Mr. J. Bird to Mr. Cracroft. Weight 3½ oz.

No. 4. Fell at Bithour and Shapur 75 miles N. W. of Allahabad on the 30th November, 1822.

Weight 12½ oz.

No. 5. Fell at Mow, Ghazeepore, February 1827, procured from R. Barlow, Esq.

Weight 12½ oz.

No. 6. Fell at Manegaon in Kandeish, July 1843, procured from Captain J. Abbott, Bengal Artillery, and J. Bell, Esq. Bombay Civil Service, Collector of Kaudeish.

Weight 2½ oz.

No. 7. A very beautiful specimen, the locality of which is unknown, supposed to be from Assam: found by Mr. Piddington among the collections of the Coal and Iron Committee (Jour. As. Society Bengal Vol. XV. Proceedings June.) Of this there are two fragments which fit each other, and obviously form parts of the same meteorite. There is also a third fragment presenting the same general texture but not belonging to the same mass. This was found under the same circumstances and also among the collections of the Coal and Iron Committee.

The weight of these three fragments is as follows:—

		lb.	oz.
1	..	1	8¾
2	..		8¾
3	..		7½

No. 8. The Meteorite which fell at Shalka, in Bancoorah, on the 30th November, 1850, described at length by Mr. Piddington in the Society's Journal Vol. XX. p. 299. Of this there are several fragments both large and small, weighing altogether about 9lbs.

No. 9. A very pretty little specimen which fell at Segowlee on the 4th (6th) March, 1853. Several others are stated to have fallen with this; *Jour. As. Soc. Bengal*, 1854, Proceedings for November.

It weighs  $7\frac{1}{2}$  oz.

No. 10. Another specimen which fell at the same time as that just mentioned, and which was procured by the kindness of Mr. Glover, C. S. It is longer than the former, but less regular in form; *Jour. As. Soc. Bengal*, 1855, p. 247.

It weighs 1lb.  $2\frac{1}{2}$  oz.

No. 11. A large meteorite, part of the same fall at Segowlee. At least thirty are said to have fallen. This weighs 14lbs. *Jour. As. Soc. Bengal*, 1856, p. 170.

*Meteoric Iron or Stones having a large proportion of it.*

No. 12. Meteoric stone containing Iron and Nickel, which fell at Panganoor in 1811 procured from Mr. Ross of Caddapah. Weight  $3\frac{1}{2}$  oz.

No. 13. Small fragment of meteoric Iron, from Siberia, procured by Pallas.

No. 14. Small piece of meteoric Iron from Sergipe, Brazil, Mor-nay and Wollaston.

No. 15. The large mass of Iron, described by Mr. Piddington at some length in Vol. XVII. P. II. p. 538 of the Society's Journal.

Weight of mass  $156\frac{1}{4}$  lbs.

Of these 15 varieties, your committee have to report that in their opinion specimens may, without injury to the Society's collections, be transmitted to the Vienna collection, of the following.

1st. Of the large mass of Knrrukpnr Iron. They recommend that arrangements be made for having a portion of this mass sawn off. They believe that this will improve the specimen for the purposes of the Society's museum by shewing the internal structure of the mass (by much the most interesting feature in such irons) and which is not at present any where visible in the mass.

2d. Of the three specimens of the meteorite from Allahabad, communicated by Dr. Tytler, they recommend that one be sent to Vienna.

3d. Of the specimens presumed to be from Assam, they are of opinion that one could be sent without injury to the Society's Collection.

4th. Of the Shalka meteorite, of which there are numerous fragments, they recommend that a good specimen be sent.

5th. Of the large specimen from Segowlee, they would recommend that a cast be made to preserve a good record of the general form of the mass, which is peculiar, and that subsequently the smaller portion, at present loose, be transmitted to The Imperial Cabinet of Mineralogy at Vienna, together with a copy of the cast of the whole.

With reference to the liberal proposal of Dr. Haidinger on his own part, and that of Dr. Hörnes, they suggest that the anxious desire of the Society to possess any such additional varieties of the meteoric stones or Irons, as the Imperial Cabinet of mineralogy can provide, be communicated to Dr. Haidinger with an expression of the wish that he would select from their duplicates such specimens as, after examination of the Indian varieties forwarded, he might consider most illustrative of the nature of these interesting specimens.

Your Committee would direct your attention to the very cordial and friendly terms in which the application of the Imperial Museum of Mineralogy at Vienna has been conveyed, and feel confident that these feelings will be fully reciprocated.

Time has not permitted of their preparing any more detailed account of the structure, composition, &c. of the specimens referred to.

(Signed)	T. OLDHAM,
„	W. S. ATKINSON,
„	T. THOMSON.

The recommendations of the Council were sanctioned and ordered to be carried out.

From Baboo Radhanauth Sikdar abstract of the results of the Hourly Meteorological Observations taken at the Surveyor General's office during the month of December last.

The Council reported that they had altered the hour of the general meeting from 8½ to 9 o'clock believing that the later hour would be more generally convenient, but that as some difference of opinion had been expressed on the matter, they desired to refer it to the decision of the members.

The meeting decided that the change was desirable during the hot weather.

Rev. J. Long read a paper entitled *Notes and Queries on a visit to Orissa in 1859.*

The thanks of the meeting were voted to Mr. Long for his interesting paper.

With reference to Mr. Long's suggestion that the Cuttack Hills should be examined by a Botanist, Mr. Samuells remarked that something had already been done in that direction by Lieut. Beddome of the 40th M. N. I. an accomplished Botanist, who, during his stay in Cuttack took every opportunity of adding to our botanical knowledge of this region. Mr. Samuells feared that Mr. Long's expectation of discovering antiquities in the Cuttack Hills would not be realised. He himself had traversed a considerable portion of them and had found no traces of ancient buildings. From the earliest notices we have of them, they appear always to have been inhabited by a poor and semi-barbarous race of people.

It was possible as Mr. Long supposed that the Hindu city of Bhubaneswar had been founded on the ruins of a more ancient Buddhist city, but it might be doubted if Buddhism had ever become the paramount religion in Orissa. The inscriptions over the caves showed, if he recollected right, that the king who recorded his deeds there, had adopted the Brahmical faith on ascending the throne. The site of the ancient city of Kosala did not seem to be quite certain, but Mr. Turnour's Ceylon discoveries showed that it had been a city of note in the Kingdom of Kalinga and that the sacred Book of Buddha had for a time been deposited there. Mr. Samuells confirmed Mr. Long's account of the great beauty of the lintel of the door-way now lying in the sand near the old temple at Kunaruk commonly called the Black pagoda. He considered it far superior to any of the sculptures in the Museum and advised that when a pilot vessel is despatched to Pooree in the cold weather, the Government be requested to allow her to call at Kunaruk and take the stone on board. He regretted that Captain Dixon's Photographs had not been laid on the table to illustrate Mr. Long's remarks on the caves at Khundgiri, but bore testimony to the fidelity of his descriptions and the general value of his remarks.

Mr. Cowell read Professor Max Muller's paper on the origin of writing in India.

The thanks of the Meeting were voted to the learned Professor for his extremely able and valuable paper.

Major R. Tytler exhibited another most interesting selection from his fine series of photographs illustrative of Indian architecture, for which he received the thanks of the meeting.

The officiating Librarian submitted the usual monthly report.

List of Books received in May.

*Presentations.*

Prison returns of the North Western Provinces, for the year 1856.—  
FROM THE GOVERNMENT N. W. PROVINCES.

Report of the Results of the Administration of the Salt Department during the year 1857-58.—Do.

Selections from the Records of the Madras Government, No. LIII. A, viz. Report of the Railway Department for 1857.

No. 55. Report on Civil Dispensaries for 1857.—BY THE HOME GOVERNMENT.

Zeitschrift der Deutschen Morgenlandischen Gessellschaft, Dreizehnter Band 1 and 2 Helf. *Leipzig*, 1859.—BY THE ACADEMY.

Contribution towards an Index to the Bibliography of the Indian Philosophical Systems. By Fitz-Edward Hall, M. A., Calcutta, 1859.—BY THE AUTHOR.

Atlantis, a Register of Literature and Science, conducted by the Members of the Catholic University of Ireland, No. III., January, 1859.

Report of the Government Central Museum, Madras.

Hindu Law and Judicature from the Dharma Sastra of Yajnavalkya, by E. Roer and W. A. Montriou.—BY THE EDITORS.

Report of the Oriental Seminary for the year 1858-59.

*Purchased.*

Literary Gazette, Nos. 38, 39, 40 and 41.

Annales des Sciences Naturelles. Tome IX., No. 6.

Revue des Deux Mondes for 15th March, 1859.

Conchologia Iconica, Part 183. Crucibulum, Pinna, Columbella.

Athenæum for March, 1859.

Comptes Rendus, Nos. 9, 10 and 11, 1859.

American Journal of Science and Arts, No. 80, March, 1859.

Revue de Zoologie, No. 2, 1859.

Annals and Magazine of Natural History, No. 16, April, 1859.

Proceedings of the Royal Geographical Society of London, Vol. III. No. 2.

Westminster Review, No. 30, April, 1859.

Histoire de la Litterature Indienne. Par Alfred Sados. *Paris*, 1859.

La Puissance Militaire des Anglais dans l'Inde et l'insurrection des  
Cipayes, par le Commandant, Ch. Martin. *Paris*, 8vo., 1859.

Revue Americaine et Orientale, No. 1. *Paris*, 1858, pamphlet.

Die Lieder des Hafis, Von Hermann Brockhaus, Vol. 2, Parts 1 and 2.

Pantschatantrum, Pars secunda, particula prima.

Roussac's Calcutta Directory, for 1859.

The following additions have been made to the Library since the Meeting in June last.

*Presentations.*

The Indian Annals of Medical Science, No. XI., January, 1859.

Proceedings of the Royal Society, Vol. IX., No. 34.

London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science, Nos. 114 and 115, for April and May, 1859.

The Oriental Baptist for June, 1859.—BY THE EDITOR.

The Calcutta Christian Observer for June, 1859.—BY THE SAME.

The Oriental Christian Spectator for May, 1859.—BY THE SAME.

Rollin's Ancient History, in 6 Vols. By T. Oldham, Esq.

Narrative of the Mutinies in Oude. By Capt. G. Hutchinson, B. Engineers.—FROM THE GOVERNMENT OF INDIA.

Observations sur les Mœurs De divers Oiseaux du Mexique, par H. de Saussure. *Genevé*, 1858.

Description de Divers Espèces Nouvelles ou peu Connues du Genre Scolia, par H. de Saussure. *Paris*, 1858.

Catalogus Codicum Hebraeorum Bibliothecae Academy Lugduno, Batavae, Auctore M. Steinschneider, 1858.—BY THE BATAVIAN SOCIETY.

Journal of the North-China Branch of the Royal Asiatic Society, No. II. May, 1859, Shanghai.

Report on the Land Revenue Administration of the Lower Provinces, for 1857-58.—BY THE BENGAL GOVERNMENT.

Memoires de la Societe Imperiale des Sciences Naturelles de Cherbourg. Tome IV. 1856 and Tome V. 1857.—BY THE SOCIETY THROUGH THE FRENCH AMBASSADOR.

Memoirs of the Geological Survey of India, Vol. 2, Part 1. On the Vindhyan rocks and their associates in Bundelkund, with Map.—By II. B. MEDLICOTT.—BY THE GEOLOGICAL SUPERINTENDENT.

Annual Report of the Superintendent of the Geological Survey of India, &c. 1858-59.—Do.

Bibidharta Sangraha for Pous and Bysakha, Saka, 1780-81.—BY THE EDITOR.



A Panoramic View of the Mountains of Kashmir, sketched by Capt. T. G. Montgomerie.—BY MAJOR H. L. THUILLIER.

Abhandlungen für die Kunde des Morgenlandes—1. Band, No. 5. *Liepzig*, 1859.

*Purchased.*

The Natural History Review and Quarterly Journal of Science, for April, 1859.

The Quarterly Review, for April, 1859.

Revue et Magazin de Zoologie, No. 3, 1859.

Annals and Magazine of Natural History, No. XVII. for May, 1859.

Revue des deux Mondes for 1st and 15th April, and 1st May, 1859.

Annales des Sciences Naturelles, Tome X. No. 1.

Journal des Savants, March and April, 1859.

Comptes Rendus, Nos. 12 to 16, March and April, 1859.

The Literary Gazette, Nos. 42 to 46.

The Athenæum for April, 1859.

A Grammar of the Arabic language, translated from the German of Caspari. By William Wright. Vol. 1st, 1859.

Edinburgh Review for April, 1859.

The Unadi Sutras of Ujjaladatta.

FOR JULY, 1859.

The monthly General Meeting of the Asiatic Society of Bengal was held on the 6th Instant.

A. GROTE, Esq., President, in the Chair.

The proceedings of the last Meeting were read and confirmed.

*Presentations were received.*

1. From Herr Robert Schlagintweit of Berlin a case containing 20 Ethnological copper casts of Heads from India and High Asia, together with a prospectus of Messrs. Schlagintweit's collection of the same.

These casts are a selection from a large collection, comprising 270 casts of the face, and 31 of the hands and feet, made by the Messrs. Schlagintweit during their recent travels in Asia.

The original moulds have been reproduced by making strong metallic casts of zinc the basis, and coating them with a galvanoplastic deposit of copper varied in tint according to the different degrees of colour of the native Tribes.

The entire series supplies perhaps the most important contribution, that has yet been made to the study of Indian Ethnology.

Major Thuillier, proposed a special vote of thanks to the Messrs. Schlagintweit for this very valuable and interesting contribution to the Society's Museum.

Carried unanimously.

2. From J. W. Garstin, Esq., Deputy Magistrate, Buxar, through E. A. Samuells, Esq., 2 stone and 2 iron shot for the wooden guns previously presented to the Society by Mr. Samuells, and some broken fragments of the same.

3. From T. Oldham, Esq., a copy of Rollin's Ancient History in 6 vols. ; Memoirs of the Geological Survey of India, Vol. II. Pt. I. and Annual Report of the Superintendent Geological Survey of India, &c. for 1858-59.

4. From Mons. Garcin de Tassy, a copy of an address delivered by him, May 5th, 1859, at the opening of his Hindustani course at the Ecole Imperiale des langues Orientales Vivantes.

5. From Major H. L. Thuillier, part of a Panoramic view of the Kashmir mountains, sketched by Captain T. G. Montgomerie.

R. H. M. Warrand, Esq., B. C. S, duly proposed at the last Meeting was ballotted for and elected an ordinary member.

The following gentlemen were named for ballot as ordinary members at the next Meeting.

C. W. Wilmot, Esq. proposed by Mr. Atkinson and seconded by Mr. Grote.

Captain J. E. Gastrell, 13th Regiment N. I. proposed by Major H. L. Thuillier and seconded by Mr. Grote.

J. B. N. Hennessey, Esq. 1st. Asst. Great Trig. Survey of India, proposed by Lieut.-Col. A. S. Waugh, and seconded by Mr. R. Spankie.

Lieut. W. G. Murray, 68th N. I. proposed by Lieut.-Col. A. S. Waugh and seconded by Major Thuillier.

W. Scott, Esq. chief Draftsman, S. G. O. proposed by Lieut.-Col. A. S. Waugh and seconded by Major H. L. Thuillier.

W. T. Blanford, Esq. proposed by T. Oldham, Esq. and seconded by Mr. Grote.

J. Obbard, Esq. proposed by Major Thuillier and seconded by Mr. Atkinson.

Baboo Boloi Chand Singh proposed by Baboo Rajendralall Mitter, and seconded by Baboo Jadava Krishna Singh.

Maharajah Narendra Narain Bhupa of Cooch Behar, proposed by Baboo Rejendralall Mitter, and seconded by Mr. Grote.

The President on the part of the Council moved that the Society do sanction the expenditure of a sum not exceeding Rupees 500 for the purchase of Books from the Library of the late Dr. Walker now on sale. Sanctioned.

*Communications were received*

1. From C. Beadon, Esq., Secy. Government of India, Foreign Department, enclosing copy of a letter to the Government of Bombay from Her Majesty's Consul at Zanzibar reporting the arrival at that place of Captains Burton and Speke on their return from the Equatorial African expedition and enclosing a sketch map of their route by Captain Speke.

The following is the letter:—

FROM CAPTAIN C. P. RIGBY,

*Her Majesty's Consul and British Agent, Zanzibar.*

TO H. L. ANDERSON, ESQ.

*Secretary to Govt., Bombay,*

*Zanzibar, March 17th, 1859.*

SIR,—I have the honor to report, for the information of the Right Honorable the Governor in Council, the safe arrival at this port on the 5th instant of Captains Burton and Speke of the East African Expedition. Both these officers were suffering from the effects of exposure and privations, but are already considerably improved in health, and they proceed to Aden, in an American vessel, which sails in a few days.

The objects contemplated in sending this expedition into East Africa appear to have been most successfully carried out as far as the limited time and means at disposal would admit of the exploration of so vast an extent of country.

The Lake of Tanganyaka situated about 600 miles from the East Coast, and never before visited by any white man, has been discovered and partially surveyed. Captain Speke travelled alone through an unknown country for about 5 degrees to the North East of Lake Tanganyaka and discovered the Lake Nyanza, a vast sheet of water extending North and South. The south extremity of this Lake is





REFERENCES

- Water
- Caravan's Route
- Mountains
- Principal places

(Signed) J. Mc Spoke Lt  
E. African Expedition

situated in 2° 25' south Latitude and its length is so great, that no native on its shores has any idea where its northern limit terminates : and from its great elevation 3700 feet above the sea and the general slope of the country, Captain Speke is confidently of opinion that the northern end of this great lake will prove to be the source of the white Nile.

Both Captains Burton and Speke talk in the highest terms of the assistance afforded to the expedition by His Highness Said Majid, and his officers, and of the friendly reception they everywhere met with from the Arab residents in the interior, through being provided with recommendations from His Highness.

Captain Speke describes the country visited by him as very populous, the Natives very friendly and courteous, the land well cultivated producing a great variety of grains and vegetables, Coffee, Cotton, Sugar cane, &c. also abundance of rich iron stone.

The Belooch Sepoys and Arabs who accompanied the expedition all talk of Captain Speke with the greatest affection ; by his kind and considerate treatment of them, he has acquired their entire confidence, and they are ready to accompany him again to any part of Africa ; from his tact in conciliating the Natives, his resolution, and scientific acquirements, I am confident he has proved himself eminently qualified for any future African explorations.

I herewith annex a small sketch Map by Captain Speke showing the routes travelled by the expedition, and the position of the newly discovered Lakes.

I have the honor to be, &c.

(Sd.) C. P. RIGBY, CAPT.

2. From Baboo Radhanauth Sikdar, an abstract of the Hourly Meteorological Observations taken at the Surveyor General's Office in the month of January last.

3. From Major H. L. Thuillier a memorandum on the Survey of Cashmir from the reports of Captain T. G. Montgomerie, Bengal Engineers, and the Surveyor General of India.

The paper was read by Major Thuillier, who also exhibited some fine specimens of topographical plan-drawing executed by the Officers of the Trigl. Survey.

The thanks of the meeting were given to Major Thuillier, for his very interesting paper.



The Officiating Librarian submitted the usual monthly report.

*Special Meeting.*

The meeting was then made special, pursuant to notice, in order to decide upon the reduction in the rates of subscription, and the rescinding of rule 49 as proposed by the Council.

The Secretary read the report of the Council recommending, that the existing rules, which regulate the rate of subscription be rescinded, and that in lieu thereof the following be adopted.

“Ordinary members shall be divided into two classes, one *Resident*, one *Non-resident*. All members who reside within 30 miles of Calcutta shall be deemed *Resident*. Residents shall pay an admission fee of Rupees 32, and a quarterly payment of Rupees 12. Non-residents shall pay an admission fee of Rupees 32, and a quarterly payment of Rupees 6. All payments to be made in advance, commencing from the quarter in which members are elected and continuing so long as they are residents in India.”

The question having been put by the President, the votes were found to be as follows:—

*For the new rule.*

Resident voters present, .. .. .	13
Non-Resident, .. .. .	19
	Total, .. .. .
	32

*Against*

Resident voters present, .. .. .	5
Non-Residents, .. .. .	0
	Total, .. .. .
	5

The new rule was therefore carried.

The Lord Bishop suggested that it might be desirable to provide for the payment of a single sum by way of composition for the annual subscriptions.

After some conversation the President undertook to bring the matter before the Council for consideration.

The question that rule 49, which prohibits the nomination or election of members on the day of the annual meeting, be rescinded, was then put and carried unanimously.

*Report of Curator, Zoological Department, for February to May Meetings, 1859.*

I have first to report on a few more gatherings from the Andamán Islands, additional to those noticed in Vol. XXVII, p. 267 *et seq.*

In the class of mammalia, inhabiting the dry land, we still know only of the human animal and the peculiar *SUS ANDAMANENSIS*; though Bats of different kinds have been observed, which as yet are undetermined; also a species of Rat, which is not of recent introduction.\* A slight notice and very rude figure of the skull of the tiny Hog from the *Little Andamán* are given in Jameson's *Edinburgh New Philosophical Journal*, Vol. XVI. (1826-7); † and to the imperfect description of this animal in my last report, it may be added that the tail is reduced to a mere tubercle (as in Mr. Hodgson's *PORCULA SALVANIA*). The animal is well clad with somewhat shaggy black hair.

1. Capt. Neblett, of the Steamer 'Sydney,' has presented us with some bones of a nearly half-grown Duyong (*HALICORE*), found in an Andamánese hut. They consist of a lower jaw, the two scapulæ, and four ribs; all daubed over in the usual way with stripes of the red pigment with which the islanders besmear their own persons. This is the first instance we know of the Dnyong inhabiting the Bay of Bengal; though common in the Straits of Malacca and in the Gulf of Calpentyn in Ceylon, and also found off the Malabar coast, where known to Europeans as a Seal! The lower jaw from the Andamáns exhibits the deciduary præmolars worn by attrition to a flat surface, while the first pair of true molars had not yet pierced the gums, but were about to do so.

In the bird class, the Parrots have not yet been determined. Living specimens of *HÆMATORNIS CHEELA* and of *BLAGRUS LEUCOGASTER* have

\* A Mouse has since been taken from the stomach of a *TRIGONOCEPHALUS* from Port Blair. It appears to be the ordinary house Mouse of India (*MUS MANEI*), and is therefore doubtless an importation. I have also information of a small quadruped from the same locality, which is probably a *TUPAIA*.

† All that is stated, however, occurs in the description of an Andamánese hut:—"Ranged in a row round the walls, were the smoked skulls of a diminutive Hog; the canine teeth shorter than in the other species of *SUS* in eastern countries, the jaws fastened together by strips of rattan." I have only seen the tusks of the lower jaw, and they are of full proportionate size. In the larger and older of two lower jaws, the tusks protrude more than  $1\frac{1}{2}$  in. from the bone, measuring anteriorly; in the other they are loose, had protruded more than  $1\frac{1}{4}$  in., as shewn by the colouring, and drawn from the socket they measure  $4\frac{1}{2}$  in. round the curve outside, and 3 in. in a line from base to *ground* tip externally.

been brought from Port Blair; and it appears that the latter species is common, as might be expected. This fine Sea-eagle preys chiefly on Sea-snakes; as the *CIRCAËTUS GALLICUS* does upon Land-snakes, whereas its near ally, the *HEMATORNIS CHEELA*, subsists almost wholly on Frogs.

2. We are further indebted to our Secretary, Mr. Atkinson, for a few sundries from Port Blair, including perhaps a new species of black-naped Oriole, additional to the five noticed in Vol. XXIV. p. 477; but it requires to be compared with *O. CORONATUS*, Swainson (*O. hippocrepis*, Wagler), of the eastern archipelago, of which we do not possess a specimen. From *O. MACROURUS* of the neighbouring Nicobar Islands, to the southward, it is very conspicuously distinct. Some years ago a Javanese specimen of *O. CORONATUS* was lent to me, from which I took the following note. "Differs from *O. INDICUS* in having a narrower nape-mark, a shorter wing, and by the considerably reduced development of the yellow on the secondaries and tertiaries." The Andamán Oriole has no yellow at all on the secondaries and tertiaries, beyond a small yellow spot tipping the latter, and a slight *terminal* yellowish-white margin to the former. Colour of male brilliant yellow, with the nape-mark, wings beyond the coverts of the secondaries, and a portion of the tail, deep black. The female has a duskyish tinge on the mantle, and the exposed portion of the black part of the wings is tinged with green, as also the middle tail-feathers for the greater portion of their length. Middle tail-feathers in both sexes slightly tipped, and the rest successively more so to the outermost, with bright yellow. Bill carneau and legs plumbeous, as usual in the genus. Wing  $5\frac{1}{4}$  in; tail  $9\frac{3}{4}$  in.; bill to gape  $1\frac{3}{8}$  in. *N. B.* In colouring, this species resembles *O. MACROURUS* of the neighbouring group of the Nicobars, but it is smaller with narrower nape-mark and proportionally shorter tail, which last is commonly 5 in. in *O. MACROURUS*.

*EDOLIUS MALAYENSIS*, nobis. The *Bhimrāj* of the Andamans, as was remarked on a former occasion, is identical with the Malayan species, with rudimentary frontal crest. I had then only a young bird to judge from, but have now an adult, with well developed racket-tail, though perhaps a female. It agrees with some specimens from Pinang, having the frontal crest so rudimentary as to be scarcely noticeable unless specially looked for, and therefore accords better than any other with Sonnerat's figure of his *Grand Gobemouche de la côte de Malabar* (so nearly crestless a race being, however, unknown on the western side of the Bay of Bengal). Some Pinang specimens, however (perhaps males), have a slight frontal crest, measuring from  $\frac{3}{8}$  to  $\frac{1}{2}$  in. long, when the feathers are pulled straight, and which is therefore conspicuously noticeable, though small. It is probably longest

in particularly fine old males: yet in one specimen from Pinang with unusually developed racket-tail, the crest is small and inconspicuous. The length of wing, in Pinang specimens, seems rarely to exceed 6 in.: in the example referred to, with particularly fine tail, it is just 6 in. In our adult Andamán specimen, with scarcely a trace of frontal crest, the closed wing measures  $6\frac{1}{2}$  in., and 6 in. in our young Andamán specimen. In three adult examples now brought from the interior of the Tenasserim provinces by Mr. Atkinson, the length of wing varies from 6 to  $6\frac{3}{8}$  in., and the crest is moderately developed, though still rather small, some of the feathers composing it measuring  $1\frac{1}{4}$  in. We have a Tenasserim specimen, however, with the longest crest-feathers  $2\frac{1}{2}$  in. in length; wing  $6\frac{3}{4}$  in.: another from Tippera, with crest-feathers  $2\frac{3}{8}$  in., and wing  $6\frac{7}{8}$  in. But in the ordinary *Bhimráj* of Bengal, Nepal, Asám, Syllhet, and Arakan, the crest-feathers rarely exceed  $1\frac{3}{4}$  in., and are generally less; while the wing in adults is commonly from  $6\frac{1}{2}$  to nearly 7 in. It is probable that the crest is mostly larger in the male than in the female, and longest in particularly fine old males—even to the extent represented by Stephens in his continuation to Shaw's Zoology, which figure may be contrasted with that of Sonnerat.

In an example from Ceylon, the closed wing is but  $5\frac{3}{4}$  in.; and the frontal crest is little larger than in some Pinang specimens, the feathers straightening to  $\frac{5}{8}$  in.: but the bill measures only  $\frac{3}{4}$  in. from nostril to tip; whereas in the adult Andamán bird it is here a full inch, about  $\frac{7}{8}$  in. in the Pinang specimens, and commonly 1 in. in the long-crested specimens from Bengal, &c. Two examples from the peninsula of India agree exactly, so far as I can perceive, with ordinary Tenasserim specimens, which seem to have the crest rather smaller, on the average, than the birds obtained further north. The *Edolius dentirostris* and *D. orissæ* of Dr. Jerdon (*Madr. Journ.* XIII, 121.) are much in need of confirmation. After considerable study of numerous specimens from various localities, I can at present recognise two races only, as sufficiently distinguishable, being the crestless or almost crestless one from the Andamáns and Malayan peninsula, and the conspicuously crested race elsewhere. When better known, each from an adequate series of both sexes and of all ages from whatever locality, it is probable that these will be acknowledged as two species; and then follows the question of nomenclature.

The crested is the *Cuculus (!) paradiseus* of Linnæus, founded on the *Cuculus siamensis cristatus viridis* of Brisson, wherein both the existence of the crest and the *habitat* are indicated; ergo EDOLIUS PARADISEUS.

The crestless (more or less so) is the *malabaricus* as described by Latham after Sonnerat, but not as figured by Latham and by Stephens;

but the name *malabaricus* is inapplicable, as equally *rangonensis* of Gould! Wherefore, there seems no help for it but to propose *E. MALAYENSIS*; unless the name *retifer* of Temminck be adopted, which however refers to either.

*TEMENUCHUS ERYTHROPYGIUS*; *Sturnia erythropygia*, nobis, *passim*. Two more specimens from Port Blair, but still wanting the deep ferruginous colouring on the rump and upper tail-coverts: however, it is faintly indicated, and that intense colouring is probably peculiar to old males. There can be no doubt about the correctness of the identification.\*

*KITTACINCLA ALBIVENTRIS*, nobis. The peculiar *Sháma* of the Andamáns. Three more specimens, all males, and true to the characters described. It is as fine a songster as the Indian bird, by all accounts.

*IRENA PUELLA*, Horsfield; *I. indica*, A. Hay. Two males and a female. The Indian race, as distinguished from the Malayan, having shorter lower tail-coverts.

*PERICROCOTUS PEREGRINUS*, (L.)

*CARPOPHAGA SYLVATICA*, Tickell, as before.

It appears that *CALENAS NICOBARICUS* is common; † also 'Water Wag-tails' in the cold season, no doubt *MOTACILLA LUZONIENSIS* of the neighbouring countries; ‡ and that *edible nests* are collected in the islands, where there can be no doubt that the constructors of them, both *COLLOCALIA NIDIFICA* and *C. LINCHI*, occur. Mr. Alexander, in his notice of the Little Andamán, mentions having seen "flocks of Sand-larks, Curlews, &c.," which may be looked for as a matter of course. We are assured that three or four kinds of Parrot occur, which is probable enough, one being the tiny *LORICULUS VERNALIS* for certain.

Of reptiles, we know that at least that one *VARANUS* exists upon them; and Mr. Alexander remarks, of the Little Andamán, that "numerous Snakes were observed sneaking amongst the bushes. From several we had narrow escapes. Those that we succeeded in killing, were all furnished with the poisonous fangs; and many of them bore a striking resemblance to the *Coluber prester* or Viper, but they were all spotted." Most probably my *TRIGONOCEPHALUS CANTORI*, described from the Nicobars.§

\* Length of a fresh specimen  $7\frac{1}{4}$  in. by 12 in.; closed wing  $4\frac{1}{2}$  in.; tail 3 in. Bill to gape  $1\frac{1}{2}$  in.; its colour yellow, leaden-blue at base of lower mandible. Legs ochreous-yellow; the tarse 1 in.

† Colonel Phayre obtained this bird alive, from the Cocos islands N. of the Andamáns, several years ago.

‡ Lately received, both in summer and winter dress, from China (Amoy).

§ Since received, with a Mouse in its stomach; also the raro *HAMADRYAS VIT-*



Mr. Atkinson has brought one Lizard in spirit, which I take to be the female of a new species of *DILOPHYRUS*, wherein the nuchal crest is very small, and the dorsal crest is reduced to a mere keel,—perhaps a sexual distinction: on each side of the occiput a small white tubercle. As we shall probably soon receive other and male examples, with developed crests, it is not desirable to describe from this first individual.

Of fishes, only a fine species of *BALISTES*, allied in form to *B. BICOLOR*, Shaw; wholly black, except a white line at base of second dorsal and another at base of anal fins, and a narrow white edge to the tail. From the Nicobars we possess *B. BICOLOR*, and another undetermined.

Among the species collected by Dr. Liebig at Port Blair should have been enumerated *SPRATTELLA FIMBRIATA*, Val.\*

Mr. Atkinson has brought a few *Crustacea* and *Radiata*; but as I have reason to expect more extensive collections shortly, I defer noticing them further, and this also from want of space on the present occasion.

In the course of a trip to the mountains of the interior, from Moulmein, Mr. Atkinson collected various specimens, the more remarkable of which I now proceed to notice. The mammalia are—

*MACACUS CARBONARIUS*, F. Cuv.; of which *M. auratus*, Is. Geoffroy, figured in the *Zoologie* of Belanger's *Voyage*, is a *pyrrhous* variety. *M. CARBONARIUS* is the common long-tailed *MACACUS* of the Burmese countries, and is nearly akin to *M. CYNOMOLOGOS*, so abundant in the Malayan peninsula and archipelago; but has no crest on vertex, and a blackish face with white eye-lids, as in the Mangabey Monkeys of Africa. It is a great devourer of *Crustacea*, which it finds during the ebb of the tide.

*TUPAIA FERRUGINEA*, var. *peguensis*. Common from the Kás'hya hills down to Mergui.

*SCIURUS BICOLOR*, Sparrman.

*SC. CHRYSONOTUS*, nobis. Remarkably fine. From the interior.

*SC. PHAYREI*, nobis, *J. A. S. XXIV*, 476. A second example of this well marked species, true to the characters described, and obtained half-way between Amherst and Moulmein.

*TATUS*, obtained at Port Blair by Capt. Eales, commanding the 'Fire Queen,' S. V.; and from Capt. Hodge, commanding the guard-ship 'Sesostris,' at Port Blair, two specimens of *DENDROPHIS PICTUS*, greener or less bronzed than usual; together with a fine example of a fish—*PTEROIS ANTENNARIUS*, some Crabs—*GRAPSUS STRIGOSUS*, and larvæ of an *ACHERONTIA*.

\* Numerous species of fishes have since been received from Capt. Hodge, which will be noticed in a future Report.



SC. ATRODORSALIS, Gray. A fine and instructive series of this variable species, wherein the hue of the under-parts varies from pale buff to dark maronne, and the black patch on the back—greatly developed in some, is entirely wanting in others. The face appears always to be reddish, the ears deep rufous, and the whiskers are conspicuously white, whereas in the last two species they are black. Tail more or less bushy, its long hair tipped either with rufous or whitish, and sometimes a distinct white tip. It would seem that the young are pale rufous-buff underneath, with no black patch on the back; and one without black upon the back has the breast pale and the sides and belly maronne, whereas another has pale under-parts throughout and a large black dorsal patch. A common species at Moulmein.

SC. BARBEL, nobis, *J. A. S.* XVI, 875.

PTEROMYS CINERACEUS, nobis: sent also by Colonel Phayre from Pegu, as formerly from Arakan; together with a SCIUROPTERA from Pegu, received formerly from Mergui, and which I considered to be SC. SAGITTA, but shall now designate SC. PHAYREI.\*

\* The 'Flying Squirrels' are among the most difficult of groups in which to define the species or perhaps local races. Eighteen specimens of PTEROMYS were exhibited at the Meeting, which are referable to six distinguishable races; and sixteen specimens of SCIUROPTERA, which are referable to seven species or distinguishable races, that are better characterized than those of PTEROMYS. The whole are continental, and there are also various races in the archipelago; besides which, we have not yet examples of all of the continental races which have been described, nor of SC. LAYARDI from Ceylon. I will endeavour to elucidate the grand series, distinguishing those of which we possess specimens by prefixing an asterisk.

\*1. PTEROMYS PETAURISTA; *Sciurus petaurista (mas)*, Pallas: *Pt. philippensis*, Gray, apud Elliot; *Pt. oral*, Tickell. Found without variation over the forests of the whole Indian peninsula and also Ceylon. Of a dark maronne; having the fur tipped with white on the head and back: feet, and greater portion of the tail, black, the latter with occasionally a white extreme tip: lower-parts white more or less pure.

\*2. PT. CINERACEUS, nobis; *Pt. petaurista*, var. *cineraceus*, nobis, *J. A. S.* XVI, 865. From the Burmese countries—Arakan, Pegu, Tenasserim. Very like the last, but the fur more uniformly white-tipped, even on the parachute-membrane; paws black; and tail generally white almost to the end, but mostly black at the extreme tip: lower-parts white, more or less pure.

3. PT. PHILIPPENSIS (verus), Gray. Founded (it may be presumed) upon Buffon's description of the *Taguan* from the Philippines, in *Hist. Nat., Supp.* III, 150.

Of birds, an undescribed Kestrel,—

TINNUNCULUS SATURATUS, nobis, n. s. Many years ago, the Society received a specimen from Yé (Tenasserim), presented by the Rev. J. Barbe,

4. PT. ELEGANS, S. Müller; by whom figured. From Java. The white-tipped fur of the back contrasting strongly with the bright rufous-bay sides, limbs, and also paws; tail more blackish to the end; head palish rufous: lower-parts much suffused with rufous.

5. PT. PUNCTATUS, Gray (*A. M. N. H.* XVIII, 211). From Malacca. "Bright bay; back ornamented with white spots [or *splashes*]. The only species of the genus that has any white on its back. Skull much smaller than in the other Asiatic species of PTEROMYS." (Gray.) I saw the specimen described, which was taken to England by Major Charlton.

\*6. PT. INORNATUS, Is. Geoffroy (*Zoologie* of Jacquemont's 'Voyage'). From the N. W. Himalaya. Darker than in Prof. Is. Geoffroy's coloured figure, with slight hoary tips to the fur, and often not any; the paws infuscated; and the tail-tip blackish: under-parts white, with mostly a rufous tinge. So far as I have seen, this and PT. CINERACEUS grow to a larger size than the others.

N. B.—This would appear to be *Pt. albiventer* apud Gray, *P. Z. S.* 1836, p. 88, and *Br. Mus. Catal.*; but not that so named in Hardwicke's Illustrations.

PT. GRISEOVENTER, Gray, *Br. Mus. Catal.*, is thus described (?): "*a.* Beneath dark grey: *b.* Beneath paler grey, back edge of the fore-legs browner than *a.*" *Habitat* not mentioned.

PT. MELANOTIS, Gray, from Java, is not described at all: but *Pt. Diardii*, Temminck, is given as a synonyme, and *Pt. nitidus*, Gray, of Hardwicke's Illustrations, as a doubtful synonyme.

PT. DIARDII, Tem., is unnoticed in Dr. S. Müller and H. Schlegel's monograph of the genus.

\*7. PT. NITIDUS Geoff.: *Sciurus petaurista*, *fam.*, Pallas. From the Malayan peninsula, Sumatra, Java, and Borneo. Bright rufous-bay, with black paws and tail-tip: under-parts rufescent. According to Dr. Cantor, "the part of the head anterior to the ears, the cheeks, the chest, and the abdomen, are white in some individuals of either sex, one of which is figured in Hardwicke's *Illustrations of Indian Zoology*, under the denomination of *Pt. albiventer*, Gray." The same observer notices, as a doubtful variety, the PT. PUNCTATUS, Gray, having the "back very dark Indian red, with a few dashes of pure white."

\*8. PT. MAGNIFICUS, Hodgson. From the S. E. Himalaya—Nipál, Butan, Asám, and Kás'hya hills. Bay, or maronne, more or less bright, above, and copiously white-tipped: beneath white, sometimes tinged with rufous; the paws rufous in some, infuscated in others; and tail black-tipped to a variable extent.

\**Sciuropterus nobilis*, Gray; *Pt. chrysotryx*, Hodgson. From Nepál and Sikhím. Vide *J. A. S.* XVI, 866; and I adhere to the opinion there expressed that

R. C. M., which is noticed in my Catalogue of Birds (No. 69, I,) as "perthis is a mere variety of the last. The series of specimens in our museum demonstrates this beyond further question.

9. *PT. LEUCOGENYS*, Temminck. Japan.

These various races of large 'Flying Squirrels' with long and cylindrical tail bear the same relationship together, as do the numerous races of gigantic Squirrels which inhabit the same geographical region, and which were brought together by the late Prof. Temminck by the name *SCIURUS GIGANTEUS*.

The smaller 'Flying Squirrels' with flat and distichous tail constitute the genus *SCIUROPTERA*, F. Cuv.

\*1. *SC. CANICEPS*, Gray : *Sc. senex*, Hodgson. From Sikhim.

2. *SC. LAYAROI*, Kelaart, nobis, *J. A. S. XX*, 165. Mountains of Ceylon.

3. *SC. BABERI* (?), nobis, *J. A. S. XVI*, 866. Trans-Himalayan ?

\*4. *SC. FUSCOCAPILLA*, Jerdon, nobis, *J. A. S. XVI*, 867. Malabar. Akin to the next. (A good species since added to the museum.)

\*5. *SC. FIMBRIATA*, Gray : *Pteromys Leachii* (?), Gray. N. W. Himalaya.

\*6. *SC. ALBONIGRA*, Hodgson : *Pteromys Turnbullii*, Gray. S. E. Himalaya.

\*7. *SC. VILLOSA*, nobis, *J. A. S. XVI*, 866. Sikhim, Butan, Asamese mountains.

8. *SC. HORSFIELDII* ; *Pteromys Horsfieldii*, Waterhouse : *Pt. aurantiacus*, Wagler. Malayan peninsula.

9. *SC. GENIBARBIS*, (Horsfield.) Java, Malayan peninsula.

10. *SC. LEPIOA*, Horsfield. Java. *N. B.* This and the preceding race or species would appear to hold the same mutual relationship as *SC. VILLOSA* and *SC. ALBONIGRA* of the S. E. Himalaya.

\*11. *SC. PHAYREI*, nobis. *n. s.* : *Sc. sagitta* of Burma, *apud nos, passim*. Rangoon, Mergui. Like *SC. ALBONIGRA*, but considerably smaller, and the tail much less bushy. Length 6 to 6½ inches ; the tail (vertebræ) 5¼ in. ; hind-foot with claws 1¾ in.

\*12. *SC. SPAOICEA*, nobis, *J. A. S. XVI*, 867. Size of *SC. VOLUCELLA* ; from Arakan.

13. *SC. MOMOGA*, Temminck and Schlegel. Japan.

14. *SC. VOLANS* ; *Sciurus volans*, L. : *Pteromys sibiricus*, Desmarest ; *Pt. russicus*, Tiedemann. Siberia, Lapland.

15. *SC. VOLUCELLA* ; *Sciurus volucella*, Pallas : *Mus volans*, L. ; *Sciurus acrobates*, Schreber ; *Sciuropterus americanus*, Desm. N. America. (')

16. *SC. SABRINA* ; *Sciurus sabrinus*, Shaw : *Sc. hudsonius*, Forster. N. America.

*N. B.*—The true *SC. SAGITTA* will be a small Javanese species. M. M. Temminck and Schlegel unite under this name Nos. 5, 6, 8, 9 and 10, which can be little more than guess-work. The first three of this series attain to about 2 ft. in total length : No. 12 scarcely exceeding 9 in.

(') Of this we possess a skeleton.

haps the female of a distinct race, remarkable for the great development of the black markings of its plumage." Mr. Atkinson has now brought a young female of the same race, in which the cap is fuscous, with scarcely an indication of rufous margining the feathers, the fuscous colour also predominating over the rufous upon the whole upper plumage, and on the tail the rufous bands are narrower than the black bands. The adult male is still a desideratum.

*PERICROCOTUS ELEGANS* (?), McClelland, as distinguished from *P. FLAMMEUS* of S. India and Ceylon. A female (?), of the size of *P. FLAMMEUS*, but the yellow portion of the plumage much deeper than in that species, and also much more of this colour upon the forehead, where brighter and better defined than in the female of *P. SPECIOSUS*. *P. ELEGANS* is described from Asám.

*PHYLLOSCOPUS TROCHILOIDES*, (Sundevall). Mentioned on account of the locality.

Of reptiles, *ACANTHOSAURA ARMATA*, Gray; and a beautiful Gecko from the interior:—

*NAULTINUS VARIEGATUS*, nobis, *n. s.* Unguinal and penultimate phalanges of toes long and compressed. Body and sides uniformly studded with large tubercles, which gradually disappear on the tail; the lower-parts covered with large flat scales, bounded by a prominent ridge on each flank: series of femoral pores extending quite across, and behind these, anterior to the vent, four scales larger than the rest: a few small scales posterior to the vent, followed by a series of broad subcaudal plates. Scales upon head and throat minute, those on the face anterior to the eyes larger. Eyes large with vertical pupils. Colour grey, beautifully spotted and marbled with black, set off with subdued white. Lower-parts whitish, freckled on the tail with black, and gradually more of this to the extremity, the terminal third being almost wholly blackish; above, the tail is irregularly banded. A broad dark streak bordered with whitish behind each eye, and continued irregularly round the occiput. On the back the markings appear as irregular bands, paler internally and blackish on their zigzag borders, most difficult to describe intelligibly; the head above is spotted and not banded. Entire length  $6\frac{5}{8}$  in., of which the tail measures  $3\frac{5}{8}$  in.\*

A few fishes will be noticed subsequently; together with Major Berrymore's specimens and others.

\* Since referring the above species to *NAULTINUS*, Gray, I have seen his figure of *N. PACIFICUS* (*Platydictylus Duvaucelii*, D. et B.), of new Zealand, in the Zoology of the Voyage of H. M. S. 'Erebus,' and perceive no reason to alter the arrangement.

3. R. Swinhoe, Esq., of Amoy, has favored us with a collection of bird-skins from Amoy and Formosa, supplying fine examples of several species which have hitherto been poorly represented in the museum.

Among these may be noticed *GRACUPICA NIGRICOLLIS* (*Pastor temporalis*, Tem.), and *TEMENUCHUS SINENSIS* (*Oriolus sinensis*, as distinguished from *chinensis*, Gmelin); and there are also fine specimens of *S. SERICEUS* and of *ACRIDOTHERES CRISTATELLUS*.

Also several species more or less common in Lower Bengal, or hitherto known only or chiefly from the Himalaya; as *HALCYON SMYRNENSIS*, *CERYLE RUDIS*, *ALCEDO BENGALENSIS*, *YUNX TORQUILLA*, *CUCULUS TENUIROSTRIS*, *HIRUNDO RUSTICA* (*gutturalis*), *H. DAURICA*, *DICRURUS MACROCERCUS*, *LANIUS LUCIONENSIS* (*verus*), ; *COPSYCHUS SAULARIS* (fœm.), *IANTHIA RUFILATUS* (fœm.), *PHYLLOSCOPUS FUSCATUS*, *REGULOIDES PROREGULUS*, *R. CHLORONOTUS*, *HEMICHELIDON LATIROSTRIS*, *MOTACILLA LUZONIENSIS* (summer and winter plumage), *CORYDALLA RICHARDI*, *PIPASTES AGILIS*, and some common small waders, as *ACTITIS GLAREOLA* and *A. HYPOLEUCOS*, and *TRINGA SUBARQUATA*.

Of species new to the museum, a fine Bat (undetermined), the handsome Grosbeak—*EOPHONA MELANURA*, (Gm.), and several apparently new species which Mr. Swinhoe will name and describe.

4. J. H. Gurney, Esq., M. P., of Catton Hall, Norwich. Skeletons of *SULA BASSANA* and *GRACULUS CARBO*; and some skins of British birds of species either previously wanting in our museum, or insufficiently represented, and one of *MACRORHAMPHUS GRISEUS* from N. America for comparison with *M. SEMIPALMATUS*, nobis (*J. A. S. XVII*, 252), of India.

The last named species, of rare occurrence unless on the sea-coasts of this country, was not admitted as distinct by the late Prince of Canino, who, had he seen a specimen, would unquestionably have elevated it to the rank of a separate named division. It is a much larger bird than *M. GRISEUS*, with a proportionally longer and still more thoroughly Snipe-like bill, while the semi-palmation of the toes at once distinguishes it. The plumage, too, is very different, and in our Indian bird considerably resembles that of most Ruffs in winter dress: the rump is uniformly coloured with the back; whereas the other has a pure white rump, becoming gradually more mottled to the upper tail-coverts; and the Indian bird is almost wholly white under the wings, where the other has every feather mottled with dusky. The diversity of the two species is accordingly about as obvious as it well can be, while the difference of form is much greater than in very many divisions separated and named by the Prince of Canino. Concurring in the opinion that it should be thus separated, I propose for it the name *PSEUDOSCOLOPAX SEMIPALMATUS*.



A fine adult example of a British Peregrine Falcon (*FALCO PEREGRINUS verus*) quite bears out the opinion of the Prince of Canino, Mr. Gould, and others, that the *Bauri* Falcon of India should be recognised as distinct, by the name *F. CALIDUS*, Latham. A glance suffices to distinguish them. The European Peregrine has more colour on the lower-parts, which, however, do not approach in depth of hue those of the *Sháhin* Falcon (*F. PEREGRINATOR*) of India; and it differs both from the *Bauri* and *Sháhin* by having the lower-parts, thighs, and beneath the wings, much more strongly barred, the breast being also much more conspicuously spotted with large well developed ‘drops.’ In the *Bauri* the breast is uniformly much whiter, and the spots are almost confined to a narrow black mark on the stem of each feather, even this disappearing on a large proportion of the feathers in some specimens. The *Bauri* has likewise much more and brighter yellow upon the cere and base of bill, than has the European Peregrine. In size and structure they agree; but admitting the *Bauri* and *Sháhin* to be distinct species, as all must admit that *know* them (and these inhabiting the same country—albeit the former keeps more to the plains and the latter to the hills), there is no alternative but to consider the European Peregrine as also equally distinct, and likewise the Australian *FR. MACROPUS*, Swainson (*v. melanogenys*, Gould).

Three specimens of the European *RALLUS AQUATICUS* present the usual distinctions from *R. INDICUS*, nobis, *J. A. S. XVIII*, 820: the Indian Water Rail being larger, with conspicuously thicker bill and legs, the latter obviously of a different colour from those of *R. AQUATICUS*. The ash-colour of the lower-parts is invariably much less pure, being always greatly mingled with brown in *R. INDICUS*. Again, there is a well marked dark streak below the eye of *R. INDICUS*, continued back over the ear-coverts, which does not occur in *R. AQUATICUS*. Length of closed wing, in three specimens of *INDICUS*, exceeding 5 in.; in the three of *AQUATICUS*, under 4½ in.; vertical depth of bill at base scarcely exceeding ¼ in. in *R. AQUATICUS*, about ½ in. (and sometimes even more) in *R. INDICUS*.\*

5. Major W. S. Sherwill. Some minute fishes from the Mutla, taken in mid-stream during the height of the tide. Among them I recognise a single individual of a second species of the genus *BOGODA*, Bleeker,

\* The Corn-crake or ‘Land-rail’ (*ORTYGOMETRA CREX*) is very rare in India, though common in Afghanistan, and Afghan specimens are undistinguishable from British. It should occur therefore about Pesháwur. The well known sportsman PURDY mentions having killed a Land-rail in Oudh, remarking that it was the only one he ever saw in India (*Beng. Sp. Mag. XIX*, 270); and this is the sole instance I know of a Land-rail having been observed in this country.



and several of a remarkable new generic form akin to the ZEUS or 'John Dory.' These are described, for want of space here, in a paper on new species of fishes.

6. Babu Rajendra Mállicka. The carcass of a male Ostrich, and of some other animals that had died in his menagerie.\*

7. W. T. Blanford, Esq., of the Geological Survey. Skeletons of GERONTICUS PAPILLOSUS and ANASTOMUS OSCITANS.

8. Mrs. J. H. Ballin. A bottle of Snakes.

9. Mr. E. C. T. Tate, of the Ganges Company's Steamer 'Mirzapore.' A fine example of SQUILLA RAPIDIA.

10. Mr. J. Floyd, Alipore. A four-legged chick, of very singular formation, which died of paralysis when a month old.

11. Dr. Mouat. Some skulls of SUS ANDAMANENSIS, nobis; and the skull of a cow Buffalo of the wide-horned type, the horns of which attain occasionally so enormous a length. (*Vide Proc. Zool. Soc.* 1855, p. 17.) A detached pair in the British Museum are each 6½ ft. round the curvature.

12. H. H. The Máharája of Burdwan. A remarkable bezoar taken from the stomach of a Giraffe. It is shaped like a short lemon, 3 in. in greatest length, encrusted with a soft calcareous substance having a smooth vermiculated surface, beneath which is a layer of the agglutinated hairs of the animal; and the same alternation occurs apparently in successive concentric layers. Among the stuffed mammalia presented by the Máharája, as noticed in Vol. XXVII, p. 273 *et. seq.*, we have since detected specimens of HYLOBATES AGILIS and GAZELLA DORCAS (*verus*).†

13. Capt. Jethro Fairweather. A fine collection of corals from Singapore; and the skull of a DELPHINUS from the Bay of Bengal.

14. Major R. C. Tytler, of the late 38th N. I. Skull of a DELPHINUS (*minus* the lower jaw), procured westward of the Cape of Good Hope; also the skull of a Camel.

\* It may be remarked that there are two very distinct types of Ostrich-eggs. One is the ordinary egg, with numerous very conspicuous pores on the surface of the shell. The other has no trace of these pores, is generally smaller, and has a smooth and highly polished surface. I have heard it confidently stated, that the latter only are found in southern Africa, while both sorts are brought from the northern portion of that continent. Are there, as the Prince of Canino suspected, two species of Ostrich? And does the smooth-shelled egg appertain to the race of Mesopotamia in the days of Xenophon, that yet lingers in the Syrian desert, and may still occur plentifully in the proximate part of Africa?

† I now recognise the Egyptian Gazelle as *G. DORCAS*; the Arabian (frequently brought to Calcutta from Aden) as *G. CORA*; and the Indian as *G. BENNETTI*.

15. The Rev. H. Baker, Junr., of Mundakynn, Alipi, Southern Malabar. A donation of the following specimens from that vicinity.

#### MAMMALIA.

PRESBYTIS CUCULLATUS; *Semnopithecus cucullatus*, Is. Geoffroy (badly figured in the *Atlas to Belanger's Voyage*): *S. jubatus*, Wagner (in Schreber's *Supplement*, a much better figure): *S. Johnii* apud Martin. The great black Monkey of the Nilgiris and Malabar ghâts, which has been much confounded with PR. JOHNII (verus), also of the Malabar ghâts, and to which the following synonyms apply:—*Simia Johnii*, Fischer, —*Semnopithecus hypoleucos*, nobis, *J. A. S. X.*, 839,—and *S. Dussumieri*, Is. Geoffroy. The latter species, or true JOHNII, is described as a variety of the JOHNII by Mr. Martin, who erroneously refers the great black species of the Nilgiris and Malabar to the same. "The cry of *woo-woo*," remarks Mr. Baker, "heard in the Malabar jungles, was supposed by Mr. Ogilby to intimate the presence of some Gibbon (*Hylobates*); but it is simply the call of the PR. CUCULLATUS. The Lion Monkey (true SILENUS)," he adds, "is found up to Goa and all through the hills, but only in the lonely dense forests; the call of the male is precisely the 'cooyeh' of a native who has lost his way and is shouting for help."\*

LORIS GRACILIS, (Geoffroy). Imperfect flat skin.

RHINOLOPHUS AFFINIS (?), Horsfield (*vide J. A. S. XXI.*, 316); a dark-coloured specimen; and NYCTICEJUS TEMMINCKII, also dark-coloured—as in fact are most of the skins of mammalia from Malabar and Travancore.

Flat skins also of VIVERRICULA MALACCENSIS, HERPESITES FUSCUS, H. GRISEUS, FELIS CELIDOGASTER (*v. viverrina*, &c.), F. BENGALENSIS, and F. CHAUS; and a skull of LUTRA NAIR, undistinguishable from the common Gangetic Otter referred to *L. sinensis*, Gray, *v. tarayensis*, Hodgson.

Of FELIS CELIDOGASTER, Mr. Baker remarks—"This wild Cat grows very large and often kills *pariâ* Dogs, and I have known instances of slave children (infants) being taken from the huts. I scarcely believed the fact, till a very large one was traced up after badly injuring a child from which it was beaten off, and in the act of killing a young calf. F. CHAUS is very common." In Bengal the F. CELIDOGASTER is mainly a

\* In a subsequent letter, Mr. Baker writes—the PR. CUCULLATUS "is found in all the Travancore and Cochin woods, also the Nilgiris and Pulneys; but the *Vella Munthee*, the other PRESBYTIS of S. India, replaces it in the plains of Malabar and Coimbatore, and is called Hunumân by the Hindus here, though they also reverence the Toque, MACACUS RADIATUS."

fishing Cat; and its habits were erroneously assigned by Buchanan Hamilton to *F. BENGALENSIS*, for which he mistook the species. A newly caught male, however, in my possession, broke through the partition which separated him from a tame Leopardess considerably larger than himself, and killed her during the night. Of *F. CELIDOGASTER*, I have seen several adults quite tame and gentle, and suffered even to range loose about a room; but I never knew either *F. BENGALENSIS* or *F. CHAUS* to be tameable in the slightest degree, however early in life the attempt had been made. A propensity for dabbling and seeking their prey in water is manifested by the kittens of *F. CELIDOGASTER* at a very early age.

“On the Nilgiris,” remarks Mr. Baker, “I saw two distinct Otters, one the large brown NAIR, and the second not half so large, almost black on the back and white underneath, and said to be common in the Pykarra river. I could not procure a specimen.” Probably one of the *AONYX* group of Otters. “The hill people mention also some creature which lives in holes in the banks of streams in the mountains, with a flat tail; some describe it as a smaller Otter, others as a Rat, and as large as a small terrier. They dive in the water, and are said to live on Crabs and Worms.”\*

*SOREX SERPENTARIUS*, Is. Geoffroy. A species which appears to be this, but of a much paler and more delicate grey colour than I have before seen, with hardly a trace of the rufous tips to the fur, is sent as the ordinary ‘Musk Rat’ of Malabar. The specimen is from Tinnevely. “It is not common,” remarks Mr. Baker, “on the Malabar coast, but very much so on the other side; the specimen has lost all smell now [by no means], but is perfectly fœtid when alive.” As compared with the common *S. CÆRULESCENS*, the present species is much smaller, with the limbs only half as large in proportion, and a much more slender tail; the teeth are also much smaller, and the superior *quasi*-incisors much less hooked. *S. HETERODON*, nobis, from the S. E. Himalaya, is nearly affined, but the teeth are considerably larger in proportion and are of a deep buff-yellow colour, whereas in *S. SERPENTARIUS* they are pure white. *S. HETERODON* appears also (on present evidence) to be rather a smaller species, with

\* Mr. Baker since writes—“The small Otter, of which I got a good view in the Ootacamund museum, is not half the size of the other, and is black on the back with a white belly. This must be the animal I told you the natives spoke of in the hill streams.” Seemingly an undescribed species.

Again, he since started a pair of the “small Nilgiri Otter” in the western ghâts; but the eagerness of his companions seems to have occasioned their escape.

proportionately stouter limbs; but I doubt if I have seen a full grown specimen.

S. (?) *VIRIDESCENS*, nobis, *n. s.* A flat skin, tail-less, and with only one hind-foot attached, but nevertheless recognisable as certainly distinct from S. *SONNERATHI*, not only by its colouring and quality of fur, but by having the hind-foot to heel  $1\frac{1}{8}$  in. long, whereas that of *SONNERATHI* is barely  $\frac{3}{8}$  in. Length to base of tail about  $5\frac{1}{2}$  in. Colour very dark; fuliginous on the face to beyond the ears; and the upper-parts slightly, the lower very conspicuously, tipped with yellowish, which imparts a dingy greenish aspect, whence the name. Fur unusually short and close, approximating the velvety character of that of the Mole. Perhaps a new genus of *Soricidæ*. Mr. Baker remarks that this is "the common species of Southern Malabar, the bite of which the natives dread as poisonous.\*"

\* Major Tytler has permitted me to examine four species of *Sorex*, more or less well preserved in spirit, from his collection.

1. S. *SOCCATUS*, Hodgson, nobis, *J. A. S.* XXIV, 30, and *Ann. Mag. N. II.*, 2nd series, XVII, 17. From the Masuri hills. Length of head and body 5 in.; of tail 3 in.; and hind-foot to heel  $\frac{7}{8}$  in. This is larger than hitherto recorded; but I do not hesitate in identifying the species.

2. S. ———? Length of head and body 2 in., of tail  $1\frac{7}{8}$  in.; hind-foot to heel  $\frac{7}{8}$  in. Colour slaty-brown throughout, a little canescent below. The *quasi*-incisive teeth particularly large and strong. In bad condition. Masuri.

3. S. ———? One of the minute species, from the same locality as S. *MICRONYX*, nobis; but of a much darker and more fuscous brown colour above, dingy canescent below, and the tail longer and more slender, containing 17 or 18 vertebræ: ears smaller and thinner than in S. *MICRONYX*; and the *quasi*-incisors larger. Length of head and body  $1\frac{1}{2}$  in.; tail  $1\frac{5}{8}$  in.; hind-foot to heel nearly  $\frac{3}{8}$  in. Masuri.

4. S. *TYTLERI*, nobis, *n. s.* A remarkable species from the Deyra doon, of a light rufescent sandy-brown colour, unusually well clad, even on the feet and tail, the last being densely covered with a shortish fur, having numerous long hairs intermixed. Fur of the body dusky for the basal two-thirds or more, and tipped with the hue described; the upper-parts being more rufescent, the lower slightly paler: form unusually robust, the basal portion of the tail exceedingly thick. The larger of two specimens, a female, measures—head and body  $4\frac{1}{2}$  in., the tail  $2\frac{3}{4}$  in. Hind-foot to heel  $\frac{7}{8}$  in. I do not think it full-grown, though Major Tytler has not seen any of larger size.

The following new species of typical *Sorex* is from China (Amoy).

S. *SWINHOEI*, nobis. Of an uniform duskyish mouse-colour, tinged below with cinereous; the ear-conch unusually large; and the fur close and velvety, or Mole-like. Length of head and body  $3\frac{3}{4}$  in., of tail 2 in.: hind-foot  $\frac{3}{4}$  in. Presented to the museum by R. Swinhoe, Esq., of H. M. Consulate, Amoy.

Some time ago, Mr. Baker asserted in a communication to a sporting periodical his belief that a real Mole existed in his neighbourhood!\* He now writes:—"I have since had three specimens of the Mole brought me, but all too far gone for preservation; they were perfectly black with white belly. Moles they certainly were." It is unfortunate that the skulls were not preserved, or even the entire skeletons in spirit; but I trust ere long to receive examples from Mr. Baker, as a *TALPA* from S. India would be a very unexpected discovery; though, as stated in the sequel, we possess the *T. LEUCURA*, nobis, from the hilly region bordering on the valley of the Sitang river in British Burma, where co-existing with a *TUPAIA* and a *HYLOMYS*!†

*PTEROMYS PETAURISTA*, (Pallas); and *SCIUROPTERA FUSCOCAPILLA*, Jerdon, nobis, *J. A. S. XVI*, 867. "The common Flying-squirrel [*i. e.* the *Pteromys*] grows much larger than the specimen sent, and they are perfect plagues in cocoa-nut gardens. The brown ones are mother and young, and were taken from a hollow tree; they lived some days, but bit those attempting to feed them so savagely, that they were killed, to my great regret." The latter species has hitherto been only known from the description cited, of a little more than half-grown specimen in rather abraded *pelage*, and the condition of that specimen induced the imposition of a not very appropriate name. Unfortunately, the adult now sent is tail-less, though otherwise in good order; and the tail of the young corresponds with that described formerly. The species most nearly resembles the *Sc. FIMBRIATA*, Gray, of the Simla and Másuri hills, but has much smaller ears, and the fringe of long hair bordering the hind-foot (from which *Sc. FIMBRIATA* takes its name) does not exist in the present animal. Fur very dense and soft, that of the upper-parts dusky-ash for the basal two-thirds, the rest a rich brown with black tips: towards the tail it inclines to be woolly; on the crown it is more fuscous, having whiter tips; and the parachute-membrane is mostly blackish above, with a pale edge: lower-parts

\* "Going through the hills, I often come upon a small black velvet-coated creature, dead, with the head bitten off. The paws are precisely like those of the English Mole, with a similar tail; the whole a finger's length and about an inch thick. It would be curious to know what kills this animal and whether it be a true Mole, as I think it."

† In a subsequent letter, Mr. Baker remarks—"With the assistance of the hill-people we contrived all kinds of springes, trap-falls, &c., in order to catch the smaller animals; but we could not manage a common Mole-catcher's trap, and I was fairly beaten by a *digger* whose runs reminded me of those of the Mole at home. He seemed to beat us by his *mining*, perhaps however by the numerous ramifications of his burrow."



rufescent-whitish, inclining to pale ferruginous round the border: feet light brown: moustaches long and black. The young is essentially similar, with tail indistinctly distichous, reaching (*vertebræ*) when reflected to between the ears; brown above, black below medially to near its base, with a slight albescent tip. Length of adult female, to base of tail, 10 in.; of hind-foot (with claws) 2 in.; of ear-conch (posteriorly)  $\frac{1}{2}$  in.: in front of and behind the ears are numerous long fine dusky hairs.

“The Flying-squirrels,” remarks Mr. Baker, “being nocturnal animals, are difficult to procure, except by watching under fruit-trees in moonlight-nights, or, when a forest is cut down, by observing the hollow trunks and securing their tenants. The noise made by these creatures at night in the depths of the old jungles, is sometimes alarming to a stranger to it.”\*

SCIURUS MAXIMUS (?), Schreber, apud Horsfield; but certainly not the *Bombay Squirrel* of Pennant, which seems rather to be SC. ELPHINSTONEI, Sykes; while the corresponding animal of Central India, so abundantly brought alive to Calcutta, is intermediate, and is always black on the upper half of the fore-limbs, but with never any black upon the croup or hind-limbs. The Southern Malabar specimens sent by Mr. Baker have the entire shoulders and upper half of the fore-limbs, and also the entire croup and haunch, black, advancing medially so as almost or quite to meet the black on the shoulders. Of hundreds of the large Squirrels from Central India, I have observed no variation worthy of remark. But these gigantic Squirrels are equally puzzling with the great Flying-squirrels (PTEROMYS).

The stuffed skin and skeleton of one in the Calcutta Medical College appears to be of an undescribed race:—

SC. ALBIPES, nobis, n. s. Like SC. MACROURUS, Pennant, but of an uniform dull brown colour above and on the outside of the limbs down to the feet, the fur very obscurely grizzled, except with whitish on the anterior half of the head. Paws whitish, with black hairs intermixed upon the toes. Lower-parts uniformly white, abruptly defined. Ears blackish externally, with no pencil-tufts. Tail dusky-brown, with a dull

\* I extract the following notice from some ‘Notes on Shooting in Kashmir,’ descriptive of the haunts of some species either of PTEROMYS or SCIUROPTERA, —probably the former, and the particular species PT. INORNATUS, Is. Geoff. “There are numbers of Flying-squirrels to be got in the forests about Wurdwán; they live in the tops of the dead fir-trees, where they make a round hole in the bark and hollow out a nest for themselves inside. On scraping with a stick at the bottom of a tree, the animal pops out its head like an Owl,” and is then easily shot. *Indian Sporting Review*, n. s. I, 35.



white mesial line below. In other respects like *SC. MACROURUS* of the southern parts of India and Ceylon. However the latter may vary, the fore-limbs from the elbow are invariably white, and also a corresponding portion of the hind-limbs; the crown is blackish, with white muzzle and white occipital patch; and there is a great admixture of white on the tail, either merely tipping the hairs more or less, or rarely almost the whole tail is white or yellowish-white. There is commonly also much white grizzling the sides of the body. From the dark limbs more especially, I take that now described to be of a particular race, equivalent to many others that are named; but the *habitat* remains to be ascertained.

Fam. *Myoxidæ*, Waterhouse.

*PLATACANTHOMYS*, nobis, *n. g.* A most remarkable new genus, having essentially the dentition, form of skull, and also the hirsute tail of a Dormouse (*MYOXUS*, *GRAPHIURUS*), but the upper-parts are densely covered with sharp flat spines, mixed with an exceedingly delicate, thin, and somewhat frizzled under-coat; with spines also on the lower-parts, but these much smaller and finer (more resembling those on the upper-parts of *MUS PLATYTHRIX*), and the soft under-coat there predominating; with no spines on the head and throat, limbs, and hind-portion of the abdomen, but the hair on the forehead and occiput full and tufty, each hair being flattened and the series passing gradually backward into spines. The skull could not be taken out without injury to our only specimen, but on the skin being relaxed and reversed, all doubt was completely removed respecting the affinity of this curious animal. The grinders, however, are only three in number, above and below, of equal size, excepting that the last above is one-third smaller than the rest; each is surrounded with enamel, with three or four transverse folds of the same, comparable to those of the grinders of an Asiatic Elephant, only simple and contiguous or very nearly so. The descending angle of the lower jaw quite resembles that of *SCIURUS*; but the coronoid process is obtuse. From what little remains of the skull, it would seem to resemble very nearly that of *GRAPHIURUS* (vide Waterhouse in *Mag. Nat. Hist.*, *n. s.*, III. 1839, p. 185), but the nasal bones do not contract posteriorly, and the inter-orbital space is also less contracted. Ant-orbital foramen as in *MYOXUS*, but the maxillary process which forms its outer wall is less than half as broad as in *MYOXUS*, or more as in *GRAPHIURUS*. Rodential tusks quite similar to those of *MYOXUS GLIS*. Comparing the feet with those of the latter animal, the structure is seen to resemble, except that in the new genus, the hallux is less developed and is nailless. The tail, too, is less hirsute on its basal third, the hairs becoming gradually longer from the base to the middle and being of equal length for the remainder; they are thinner

and coarser than in *MYOXUS*, straight, and arranged distichously, so that the hairy tail is flat as in *SCIUROPTERA*, and its lower surface is equally well clad with the upper. The whiskers are very long, some of them reaching to the middle of the body; and the soft frizzled fur of the lower-parts resembles that on the under-parts of *MYOXUS GLIS*, only mingled (except towards the throat and vent) with rudimentary spines. I can detect only two pairs of (abdominal) mammæ.

*PL. LASIURUS, nobis, n. s.* Size nearly that of *MYOXUS GLIS*; but the head smaller and shorter: a female measuring 6 in. or nearly so to base of tail, the tail (vertebræ)  $3\frac{1}{2}$  in., or to end of hair  $1\frac{1}{2}$  in. more: ear-conch (posteriorly)  $\frac{1}{2}$  in., ovoid, and all but naked: hind-foot to heel 1 in.: longest whiskers  $2\frac{1}{2}$  in., becoming exceedingly fine towards the extremity. General colour above (that of the tips of the spines) a somewhat light rufescent-brown, similar to that of the spines—as distinguished from the quills—of various Porcupines, only less intense; the thin slightly frizzled under-fur being paler. The spines are  $\frac{5}{8}$  in. long, like stiffish thin laminæ of *baleen* or ‘whale-bone;’ they gradually taper to a sharp point from the middle, and abruptly at the extreme base or point of attachment; being white, excepting at the tips which constitute the surface. On the forehead and crown, where the hair is very full (as before described), the colour is more rufescent than otherwise; whiskers chiefly black; and the lower-parts are dull or subdued white. The hairs on the tail are much darker than the body-colour, and may be described as infuscated, except at the tip of the tail where they are dull white throughout their length, forming a conspicuous pale tail-tip.

“I was ignorant of the existence of this animal,” remarks Mr. Baker, “till about a year ago, when I found it in a range of hills about 3000 ft. high. It lives in the clefts of the rocks and hollow trees, is said to hoard ears of grain and roots, seldom comes into the native huts, and in that particular neighbourhood the hill-men tell me they are very numerous. I know they are to be found in the rocky mountains of Travancore, but I never met with them in the plains. I have some hundreds of these hill people baptized Christians, and shall have no difficulty in procuring you specimens, including one preserved in spirit.”\*

\* In a letter received as the above was going to press, Mr. Baker has favored us with a notice of the habits of this species, which helps to confirm the propriety of its allocation among the Dormice. He remarks—“I have been spending the last three weeks in the ghâts, and among other things had a great hunt for the new spiny Dormice. They are most abundant, I find, in the elevated vales and ravines, living *only* in the magnificent old trees there found, in which

Of *Murida* two species are sent. A flat skin of the common *MUS FLAVESCENS*, Gray; and two ditto, sent as the 'Black Rat,' but not affined to *M. RATTUS*, L.: so far as can be judged, they resemble *M. INDICUS* in size and proportions, including length of tail; but the coat is different both in texture and colouring. In *M. INDICUS* the *pelage* is coarse and harsh, of an ordinary rat-brown colour, and quite devoid of gloss. In the Malabar animal sent, the *pelage* is soft and glossy, and very dark in colour—almost black on the face. On the back the hairs are ashy-black with slight ruddy-brown tips; on the sides and under-parts those tips are more extended and yellowish. Whiskers black. Perhaps only a dark southern variety of *M. INDICUS*.\*

they hollow out little cavities filling them with leaves and moss. The hill-people called them the 'Pepper Rat,' from their destroying large quantities of ripe pepper (*Piper nigrum*). Angely and jack fruit (*Artocarpus incisa* and *integrifolia*) are much subject to their ravages. Large numbers of the *Shunda* palm [*Borassus*?] are found in the hills and *toddy* is collected from them: these Dormice eat through the covering of the pot as suspended, and enjoy themselves. Two were brought to me in the pots half-drowned. I procured in one morning sixteen specimens. The method employed in obtaining them was to tie long bamboos (with their little branches left on them to climb by) to the trees, and when the hole was reached the man cut the entrance large enough to admit his hand, and took out the nest with the animals rolled up in it, put the whole into a bag made of bark and brought it down. They actually reached the bottom sometimes without being disturbed; it was very wet cold weather, and they may have been somewhat torpid; but I started a large brown Rat at the foot of one of the trees, which ran up the stem into a hole, and four Dormice were out in a minute from it, apparently in terror of their larger friend. There were no traces of any hoarding in any of the holes, but the soft bark of the trees was a good deal gnawed in places. I had two of these Dormice alive for some time, but as they bit and gnawed at everything intended to keep them in durance, I was obliged to kill both. I noticed that when their tails were elevated the hairs were perfectly erect like a bottle-brush. I prepared you twelve skins with the skull in each of them complete, and two complete skeletons; but the latter were lost with the box containing them in crossing a stream, the cooly being carried off his legs. I hope before long to replace this loss. The skins I will send you shortly by banghy."

\* Mr. Baker since writes—"This species replaces on the hills the *Mus providens* or *indicus* of Mr. Elliot (I think), for that is very common on the plains but is not found in the hills, though the habits of both are precisely as described by Mr. Elliot."

Of *Leporidae*, Mr. Baker asserts that the *LEPUS RUFICAUDATUS*, in addition to *L. NIGRICOLLIS*, inhabits his neighbourhood; also the true Hog Deer (*CERVUS PORCINUS*), of which Dr. Kelaart presented a living male from Ceylon, where known as the 'Paddy-field Deer' (his *C. oryzæ*).\*

ELEPHAS. "Section of a process taken from the head of a Malabar wild Elephant having perfect tusks." A remarkable concretion of ivory, taken probably from the tusk-socket, 4 in. long by 2 in. across where widest.

KEMAS HYLOCRIUS, Ogilby. *P. Z. S.* 1837, p. 81: *Capra (Ibex) warryato*, Gray, *Ann. Mag. N. H.*, X (1842), 267. "*Warra-ardu* or 'Precipice Goat.'" (Baker.) 'Ibex' of Nilgiri sportsmen. The skull of an adult male, with fine arched horns, measuring 15 in. round the curvature. "The Ibex-skull I send," remarks the donor, "I intended to have sent with his skin. The animal, when alive, was as large as an ordinary [Indian] Donkey, and so heavy that six men could with difficulty bring him in. Back almost black, sides brown, legs grizzled with white. Unfortunately the skin was quite spoiled, though it had been beautifully taken off. The female has only two teats.† They are very numerous, feeding like a flock of Sheep on the hill-tops, and only flee to the precipices when alarmed. They will even hide in jungle and grass. There is a solitary Roman Catholic church on a rock in the jungles, on the borders of Travancore and Cochin, where the wild 'Ibex' are common, and though numbers of people go there on pilgrimage these 'Ibex' walk about among them and eat the sesamum-seed given them, but do not allow themselves to be touched. They are considered holy and belonging to the church." Elsewhere the same observer remarks, writing of the game animals of the western ghâts, that—"If the mountains are at all rocky and precipitous, you will find the wild Goat or 'Ibex' close to the rocks, often in large herds, \* \* \* I have occasionally seen some of these animals much smaller than the usual size, and somewhat shaggy as to their colouring. Sportsmen in the Pulneys and Ghâts near Cape Comorin talk of a wild Sheep. I think it is probable." Scarcely so: though we do read of a "wild Sheep" as abounding in the highlands of Madura;‡ and

\* Vide note to p. 297.

† This also is stated in a *MS.* description which the Hon'ble Walter Elliot favored me with many years ago; whereas the nearly affined *Tehr* and *Goral* of the Himalaya have four developed teats. The Nilgiri animal has commonly two young at a birth, or at least the females are usually seen followed by two kids.

‡ Thornton's *Gazetteer of India*. Art. Madura; which province must not be confounded with the island so named that is close to Java.

I doubt if this refers to the 'Jungle Sheep' of Madras sportsmen (what Mr. Ogilby very naturally concluded the Nilgiri 'Ibex' to be), which is no other than the Muntjac, the *Kákur* or 'Barking Deer' of Himalayan sportsmen, and the 'Red Deer' of those of Ceylon! As an article of provender, Mr. Baker remarks, that "a quarter of 'Ibex,' hung as the country people in the mountains do at home, within a wire or muslin bag and exposed to the air, is equal to Welsh mutton." We have now to ascertain what the reputed 'wild Sheep' of the highlands of Madura is intended to mean: in all probability our present animal, rather than any other.

#### AVES.

Of birds, we are indebted to Mr. Baker for a few specimens, among them being the head of a young *BUCEROS CAVATUS*, and a good skin of *B. GINGALENSIS*. He enumerates the four species of Hornbill that inhabit the peninsula of India, viz. *CAVATUS*, *PICA*, *BIROSTRIS*, and *GINGALENSIS*; and remarks that "in all, the female is shut up with the eggs, and plasters up the entrance to the nest *with its ordure* [?]: the male feeds both mother and young. A few days since I took the mother (*B. GINGALENSIS*) out of its hole; it had stripped most of the feathers off its breast, was very weak, and had three white eggs.\* The roar of the *CAVATUS* I have often noticed strangers to the forest to be so alarmed at, as to fly as if from some terrible enemy.

"The habits of the Hornbills are very similar to those of the South American Toucans. A friend had a large tame *CAVATUS*: it watched a female terrier that had young, and in two days managed to steal and swallow three pups during her absence. Its usual food was rice and plantains." It is curious to see them feed on boiled rice. A large *CAVATUS* will pick it up grain by grain, and successively toss each grain into the air and catch it in its throat. This I have often witnessed.

The other bird-skins sent are *MEGALAIMA VIRIDIS*, *OXYLOPHUS JACOBINUS*, *DENDROCITTA LEUCOGASTRA*, *MYIOPHONUS HORSFIELDI*, *BRACHYURUS TRIOSTEGUS*, *MERULA NIGROPILEUS*, *GEOCICHLA CYANOTUS*, *TCHITREA PARADISI*, *DICRURUS LONGICAUDATUS*, *CHALCOPHAPS INDICUS*, and *GALLUS SONNERATHI*.

Examples also of the gigantic Spider, *MYGALE AVICULARIA*; which, Mr. Baker remarks, is "common in the hills. They live among stones and old bark, and are really savage creatures and poisonous too, being easily excited, when they spring upon an exposed limb and bury the fangs in the flesh in an instant. I have seen cases followed by fever and much inflammation. The Tamil name is *Tella mundalum*."

\* *Vide* also Tickell, in *J. A. S.* XXIV, 279; and Dr. Livingstone.



16. From the late Major Berdmore, of Schwe Gyen, in the valley of the Sitang river, Tenasserim provinces.\* Two considerable collections, consisting chiefly of small mammalia, reptiles, and fishes, preserved in spirit, and comprising several species of much interest and many hitherto undescribed.

### MAMMALIA.

*MACROGLOSSUS MINIMUS*, (Geoffroy). The Kiodote. The smallest of *Pteropodine* Bats (or 'Flying Foxes'), hitherto only known from the archipelago, with the exception of an example from Siam noticed by Dr. Horsfield, as "perhaps a distinct species, with a lengthened nose,"—this character being remarkable in the Tenasserim specimen.

*SCOTOPHILUS FULVIDUS*, nobis, *n. s.* A small *SCOTOPHILUS*, (having two pairs of minute upper incisors,) of a pale fulvous colour throughout, with black membranes. Length  $2\frac{3}{4}$  in., of which tail 1 in.; expanse  $7\frac{1}{4}$  in.; fore-arm  $1\frac{1}{8}$  in.; and ear-conch (posteriorly)  $\frac{5}{16}$  in. Four specimens (females).

*SC. COROMANDELIANUS*, (F. Cuv).

*MYOTIS* — ? Resembles *M. PIPISTRELLUS* in size and structure, but is of a dark fuscous hue, the fur slightly tipped with earthy-brown on the upper-parts, and much more largely tipped with a paler (almost whitish) brown below; membranes dusky. Length  $3\frac{1}{4}$  in.; of which tail  $1\frac{1}{2}$  in.;

\* We have to deplore the loss of this most energetic officer, to whom the Society has been very largely indebted for specimens in different branches of zoology for several years past; during which period he has enriched the museum to a far greater extent than any other contributor, and has been remarkably successful in procuring novelties of more than average interest. The present Report will alone amply show how industriously our lamented friend exerted himself to enrich the Society's collections, and how great therefore is the loss sustained by his decease. His friend the Commissioner of Pegu wrote, (May 31st) — "You will be sorry to hear that our friend Berdmore is no more. He was truly an excellent fellow. He had quite worn himself out by hard work. I received news of his death yesterday by telegram." It was at the request of Col. Phayre, many years ago, that Major (then Captain) Berdmore first devoted his attention to collecting specimens for the Society's museum; and whatever he could procure and preserve in spirit, he lost no opportunity of forwarding, and generally in excellent condition. Formerly in the little explored province of Mergui, and since in the valley of the Sitang river and adjacent hills, as little trodden by the naturalist, our deceased friend had better opportunities than fall to the lot of most people of procuring objects of more than ordinary interest.



expanse  $9\frac{3}{4}$  in.; fore-arm  $1\frac{1}{2}$  in.; ear-conch (posteriorly)  $\frac{1}{2}$  in. Three specimens (females).

*RHINOLOPHUS AFFINIS*, Horsfield (*verus*, *apud* Schinz; *nec apud* Cantor?).

*HYLOMYS PEGUENSIS*, nobis, *n. s.* So nearly resembling the *H. SUI- LUS* of the archipelago, figured and described by Dr. S. Müller, that I should have considered it identical, were it not for the greater development of tail. Total length 6 in.; of which tail  $\frac{7}{8}$  in.; head  $1\frac{3}{4}$  in.; ear (posteriorly),  $\frac{1}{2}$  in.; and hind-foot with claws, 1 in. Adult male and female. Hitherto this genus was supposed to be peculiar to the archipelago.

*TALPA LEUCURA*, nobis, *J. A. S. XIX*, 217. The Syllhet Mole, now for the first time obtained so far south, and very remarkable as inhabiting together with the *HYLOMYS*.

*SOREX NUDIPES*, nobis, *J. A. S. XXIV*, 34.

*SCIURUS KERAUDRENII*, Lesson.

*SC. BELANGERI*, Lesson.

*RHIZOMYS SUMATRENSIS*, (Raffles).

*MUS ROBUSTULUS*, nobis, *n. s.* A stoutly formed Rat, with tail not quite so long as the head and body, which latter measure together about 6 in. Colour much as in *M. DECUMANUS*, but the feet conspicuously whitish. Tail with short setæ of equal length throughout—not becoming longer towards the tip.

*M. CINNAMOMEUS*, nobis, *n. s.* Like *M. FLAVESCENS* but smaller, with proportionally longer tail, and softer fur of a fine cinnamon-colour (nearly as in *M. OLERACEUS*), with inconspicuous black tips; the under-parts white, which is abruptly divided from the cinnamon hue above. Length of head and body about 6 in., the tail  $7\frac{3}{4}$  in., and hind-foot  $1\frac{1}{4}$  in.

*M. FLAVESCENS*, Gray (?), *var.?* A Rat very like *M. FLAVESCENS*, but of a darker and much less rufescent hue above, would seem to abound in Pegu and the Tenasserim provinces, and probably in the Malayan peninsula; for we have a specimen of what appears to be the young of this race from Malacca. It is probably the *M. FLAVESCENS* of Dr. Cantor's Catalogue of Malayan animals; and the *M. BERDMOREI*, nobis, should perhaps be referred to it, but of this I do not feel confident at present.

*MUS* —? Very like the young of *M. NEMORALIS*, nobis; but the great development of the *testes* of the male would seem to indicate an adult. Head and body 4 in.; tail  $4\frac{1}{4}$  in.; and hind-foot  $1\frac{5}{8}$  in.

*M. NITIDULUS*, nobis, *n. s.* A house Mouse apparently, with tail equal to the head and body, and uniformly furnished with minute setæ to the end; ears large and ample. Total length  $6\frac{1}{2}$  in.; hind-foot a little exceeding  $\frac{3}{4}$  in.; and ears (posteriorly)  $\frac{9}{16}$  in. Colour nearly that of *M.*

DECUMANUS, with the under-parts subdued white tolerably well defined. Of the same subgroup as *M. MUSCULUS* and *M. MANEI*.

*M. CONCOLOR*, nobis, *n. s.* A house Mouse probably, of an uniform dark greyish 'mouse-colour' above and below; eyes of medium size, and ear-conch moderately ample; feet large, and the tail with close rings of minute setæ throughout. Length 3 in., of tail 4 in., and hind-foot  $\frac{7}{8}$  in. From the large proportional size of the limbs, it is probably not full-grown.

*M. BADIUS*, nobis, *n. s.* Like *M. OLERACEUS*, Sykes, but the eye fully twice as large, and black whiskers; colour of the upper-parts a more rufous chesnut or cinnamon hue; of the lower-parts white almost pure. Length of a female 3 in. to base of tail, the tail  $4\frac{3}{8}$  in., and hind-foot  $\frac{5}{8}$  in.

*M. PEGUENSIS*, nobis, *n. s.* A field Mouse, with tail longer than the head and body, well clad with hairs that become longer to the end. Length to base of tail  $3\frac{1}{2}$  in., of tail  $3\frac{7}{8}$  in.; ear-conch  $\frac{1}{2}$  in.; and hind-foot  $\frac{3}{4}$  in. These are the measurements of a female in spirit. A stuffed male has the tail (vertebræ)  $4\frac{1}{2}$  in. Fur very full and dense, pale yellowish-brown on the upper-parts, slightly yellowish white below: whiskers remarkably long.\*

\* Some other Mice in spirit have been sent by Major Tytler for identification. They are as follow:

*MUS NIVIVENTER*, Hodgson, *Ann. Mag. N. H.* XV. (1845), p. 267. A well marked species, rather larger than as originally described. A male measuring 6 in. long, with tail 7 in.; and hind-foot nearly  $1\frac{1}{2}$  in.: female even larger, or 7 in. long, with tail  $7\frac{1}{2}$  in. From Másuri.

*M. OLERACEUS*, Sykes: Syn.? *M. (Vandileuria) dumeticola*, Hodgson, *ibid.* p. 268. I cannot perceive in what these differ. A specimen from Asám is very slightly deeper-coloured, but I can detect no further difference. A Deyra doon example measures  $2\frac{3}{4}$  in. long, with tail  $4\frac{1}{2}$  in.

*M. HOMOURUS*, Hodgson, *ibid.* p. 268. Accords with the description, except that the largest of several specimens does not quite come up to the dimensions stated. The males measure  $3\frac{1}{2}$  in. to base of tail, and tail the same (having about 24 vertebræ); hind-foot plus  $\frac{5}{8}$  in. I have been unable to satisfy myself of the number of teats. Mr. Hodgson states—"It has eight teats only in the females. The other Mice have ten, and the Rats have twelve." As compared with the European *M. MUSCULUS*, the fur is much more Gerbille-like in character, the piles less dense and sinuous.

*M. CRASSIPES*, nobis, *n. s.* Like the preceding, but with the tail rather longer than the head and body. Length  $2\frac{3}{4}$  in.; tail  $3\frac{1}{4}$  in.; hind-foot  $\frac{3}{4}$  in. The feet particularly large, and, like the tail, well furnished with coarse short setæ. From Másuri.

*HAPALOMYS*, nobis, *n. g.* A very distinct new genus of *Muridæ*, with long and delicately fine *pelage*, and exceedingly long tail, the terminal fourth of which is remarkably flattened and furnished with hair more developed than in perhaps any other truly *Murine* form. Limbs short, with the toes remarkably corrugated underneath, the balls of the ungual phalanges greatly developed, protruding beyond the minute claws of the fore-feet, and equally with the more developed claws of the hind-feet. Head short; the ears small and inconspicuous. The skull approaches in form that of *MUS INDICUS*; but the rodential tusks are broader and flatter to the front: molars as in the *Muridæ* generally, but much worn in the specimen under examination; they are considerably less directed outward than usual, and the bony palate has therefore the appearance of being narrow: the super-orbital ridges project much outward, in form of a thin bony plate; and there is a considerable process at base of the zygoma anteriorly, and posterior to the ant-orbital foramen: zygomata broad and compressed about the middle.

*H. LONGICAUDATUS*, nobis, *n. s.* Length of male  $5\frac{3}{4}$  in. to base of tail, of tail  $7\frac{1}{4}$  in.; of female  $5\frac{1}{4}$  in., with tail  $7\frac{1}{2}$  in.: sole  $1\frac{1}{8}$  in.: ears posteriorly  $\frac{1}{4}$  in., rounded, and scantily fringed with fine long hairs. Fur long and soft, measuring about  $\frac{5}{8}$  in. on the upper-parts, slaty for the basal two-thirds, then glistening brown with black tips, and a few long hairs of very fine texture interspersed: lower-parts dull white. Whiskers black, long and fine; and there is a tuft of fine blackish hair anterior to the ears.

Specimens of adult male and female, with a young one, were forwarded by Major Berdmore.

*CERVUS (PANOLIA)* — ? *C. frontalis* apud Cantor. The *T'hámine* Stag, found also in the Malayan peninsula: an exceedingly fine head; the horns differing as usual from *Mánipur* specimens by being shorter,

*M. TYTLERI*, nobis, *n. s.* Length  $2\frac{3}{4}$  in., tail the same, having about 24 vertebræ; hind-foot  $\frac{5}{8}$  in. Fur unusually long and full, of a pale sandy 'mouse-colour' above, isabelline below, and pale on the well clad limbs and also on the tail laterally and underneath. Whiskers exceedingly fine in texture, and of a whitish colour. Male. From the Deyra doon.

*M. MUSCULUS*, L.; from England. On comparing five specimens of the common English Mouse in spirit with equally fine examples of the Indian house Mouse (*M. MANEI*), it is seen that *M. MUSCULUS* has conspicuously larger ears, much smaller eyes, broader paws, and the tail is one-fourth shorter,—measuring 3 in. in *MUSCULUS* and 4 in. in *MANEI*. The fur again is of very different texture. Accordingly the two species are obviously distinct.

especially the brow-antler, with greater tendency to subdivide at the crown. When series of horns of both races are seen together, the difference is very manifest.\*

Of birds are sent skins of *EURYSTOMUS ORIENTALIS*, *HARPACTES ERYTHROCEPHALUS*, and *LYNCORNIS CERVINICEPS*.

Of reptiles, many interesting specimens, comprising *DRACO LINEATUS*, *ACANTHOSAURA ARMATA*, *CALOTES EMMA* (very fine), *C. VERSICOLOR*, *LEIOLEPIS REEVESII*, *ASPRIS BERMOREI*, nobis (fine), *LISSONOTA MACULATA*, *XENOPELTIS CONCOLOR*, *PYTHONIA (n. g.) SEMIZONATA* (*Homolopsis semizonata*, nobis, *J. A. S.* XXIV, 187), *PARIAS* (D. and B., *nec* Gray) *MACULARIUS*, *n. s.*, *CORONELLA NOTATA*, *n. s.*, *XENODON PURPURASCENS* (several varieties), *LEPTOPHIS ORNATA*, *DIPSAS FERRUGINEA*, *D. (v. AMBLYCEPHALUS) BOA*, *HOMOLOPIS SIEBOLDII* (!), *H. LEUCOBALIA*, *NAJA TRIPUDIENS* (dark var.), *HAMADRYAS VITTATUS*, and others unnecessary to mention. Also some *Batrachia*, including an *ICTHYOPHIS*, which I am necessitated to leave undetermined for the present.

Of fishes, a very large collection, including numerous new fresh-water species, some of Himalayan types, others akin to those of the plains of India and Lower Bengal. Descriptions of all of them are awaiting publication, but they are far too numerous for introduction in this place. The group of *Cobitidæ* (or Loches), in particular, exhibits an extraordinary

\* Since the decease of Major Berdmore, we have received two more packets from him, one of them containing two flat skins of probably does of the *PANOLIA*. They are of a pale chestnut-brown colour, paler on the sides, white below; spotless with a dark mesial list which in one of the two specimens is scarcely discernible: face and limbs more or less infuscated: the tail, if (as it appears) perfect, very short. Evidently in summer coat. Not unlike *C. DUVAUCELII* in corresponding garb; but the latter is mostly more or less spotted or *menilled*, with especially a row of pale spots along each side of the dorsal list; and there is no infuscation of the face and limbs. Among the Hardwicke collection of drawings in the British Museum is a coloured figure designated as the "Spotted *Bára Sing'ha* of the Sundarbáns." This represents an unusually spotted buck, though I have seen a doe equally spotted; and the species does inhabit parts of the Sundarbáns. As with the Hog Deer, some individuals of the *Bára Sing'ha* are much more spotted than others in the summer costume, and the does are generally more so than the bucks. The most spotted buck of the Hog Deer which I have seen was sent alive from Ceylon by Dr. Kelaart. I think, however, it will be found that the Cinghalese Hog Deer (with which the Malabar species is probably identical) has longer and more *Axis*-like horns than true *C. PORCINUS*, the inner prong of the terminal fork being given off at an acuter angle; the figure of the animal being also somewhat less *Porcine*.

development of species and of well marked generic forms in the mountain streams of Burma.

Also various *Crustacea* and shells, for the most part determined, but an elaborate notice of which cannot be conveniently introduced here.

It remains only to add, that a magnificent pair of horns were exhibited at one of the Meetings, of the great Wapiti Stag (*CERVUS CANADENSIS*), or so-called 'Elk' of the Anglo-Americans, having been lent for the purpose by J. W. Linzee, Esq. The length of the skull, from vertex to tips of intermaxillaries, is  $21\frac{3}{4}$  in.; and breadth of orbits posteriorly  $8\frac{3}{4}$  in. Length of horn, measuring round the outside,  $4\frac{3}{4}$  ft.; circumference of base, immediately about the 'burr' or basal ring,  $12\frac{3}{4}$  in.; and length of brow-antler, 17 in. Greatest width of the horns apart, 3 ft.  $1\frac{1}{4}$  in.; and the tips are 2 ft.  $3\frac{1}{4}$  in. apart. This fine specimen was brought from California.

E. BLYTH.

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FOR AUGUST, 1859.

The Monthly General Meeting of the Asiatic Society was held on the 3rd Instant.

A. Grote, Esq., President, in the chair.

The Proceedings of the last meeting were read and confirmed. Presentations were received.

1. From the Officiating Junior Secretary to the Government of Bengal, a set of Photographic Drawings of the ancient buildings at Beejapore, sent out by the late Hon'ble the Court of Directors.

2. From the same, two copies of Selections from the records of the Bengal Government, No. 30, containing Reports of the Districts of Pooree and Balasore by Henry Ricketts, Esq.

3. From the Royal Society of London, the Proceedings of that Society.

4. From the Imperial Academy of Sciences in Vienna, several vols. of the Transactions of the Academy.

5. From the Royal Geographical Society of London, the Proceedings of that Society.

6. From the Royal Society of Sciences, Stockholm, Parts 1 to 5, of a Voyage round the world of the Royal Swedish Frigate *Eugenie*.

7. From Major H. B. Lumsden, 60th N. I., late in charge of the Kandahar Mission, the skull and incomplete skin of a *Ghor-Khur*,



(or so called 'wild ass,') from the vicinity of Kandahar. Also specimens of a Lizard from the same neighbourhood, known as the *Rag Mahi* or 'Sand-fish,' the horns of an *Affghan Gazelle*, and some skins of Ducks.

8. From Major S. R. Tickell, Moulmein, a large collection of birds, comprising many species of interest and some novelties, obtained during a trip to the mountainous interior of the Tenasserim Provinces; and, subsequently, a skin of the Pomarine Skua, an arctic bird never previously obtained within the tropics.

9. From Captain Hodge, Commanding the Guard-ship *Sesostris*, at Port Blair, Great Andaman, a highly interesting collection of objects of Natural History, chiefly fishes.

10. From R. Swinhoe, Esq., of H. M. Consulate, Amoy, a collection of Chinese birds, with an undescribed species of Shrew.

11. From Dr. McGowan, Ningpo, a fine specimen of a flake of *balein*, or so called 'Whale bone,' perfect and unutilated.

12. From Major W. S. Ferris, 12th N. I. a fine head and casque of *Buciros cavatus*.

13. From the Rev. J. Baker, Jr., Cochin, a valuable collection of Natural History specimens from Southern Malabar.

The following gentlemen duly proposed at the last meeting were balloted for and elected Ordinary Members.

C. W. Wilmot, Esq., Captain J. E. Gastrell, 13th Regiment, N. I.; I. B. N. Hennessey, Esq., 1st Assistant G. T. Survey of India.

Lieut. W. G. Murray, 68th N. I.; W. Scott, Esq. chief Draftsman S. G. O.; J. Obbard, Esq.; W. T. Blanford, Esq.; Baboo Boloi Chund Sing; Maharajah Narendra Narian Bhupa of Cooh Behar.

The following gentlemen were named for ballot as Ordinary Members at the next meeting.

Dr. A Campbell, Darjeeling, proposed for re-election by Mr. Grote, seconded by Mr. W. S. Atkinson.

Captain J. Sherwill, R. Survey, Dinajpore, proposed by Mr. Grote, seconded by Mr. Atkinson.

Captain H. Hopkinson, Commissioner, Tenasserim Provinces, proposed for re-election by Mr. Atkinson, and seconded by Mr. Grote.



A. E. Russell, Esq., C. S. proposed by Mr. W. Theobald, and seconded by Mr. Medicott.

W. L. Wilson, Esq., proposed by Mr. W. Theobald, and seconded by Mr. Medicott.

The Reverend F. F. Mazuchelli, D. D. proposed by Captain W. N. Lees, seconded by the President.

Major Seymour Blane, proposed by Captain W. N. Lees, and seconded by Doctor Thomson.

J. Geogeghan, Esq. C. S. proposed by Captain W. N. Lees, and seconded by Mr. Atkinson.

Doctor E. Goodeve, proposed by Doctor Eatwell, and seconded by Doctor Boycott.

Major Douglas, Assistant Professor of Natural Philosophy and Astronomy, Presidency College, proposed (for re-election) by Capt. W. N. Lees, seconded by Major Thuillier.

R. Jones, Esq., Professor of Moral and Mental Philosophy, Presidency College, proposed (for re-election) by Capt. W. N. Lees and seconded by the President.

David M. Gardner, Esq., C. S., proposed by Dr. Fayerer, seconded by Mr. Atkinson.

#### THE COUNCIL REPORTED.

1. That they had adopted and begged to submit for the adoption of the Society the following report from the Philological Committee, recommending that the publication in the *Bibliotheca Indica* of the Arabic Dictionary of Technical Terms, which it had been agreed to discontinue in consequence of the failure of funds, should now be proceeded with.

#### REPORT OF THE PHILOLOGICAL COMMITTEE.

The publications of the *Bibliotheca Indica* having been resumed, a question has arisen as to the expediency of completing the Arabic works already commenced. The letter of the late Hon'ble Court of Directors expressly gave permission for such completion, but the state of the Oriental Fund prevented the Society from proceeding with them, and it was resolved to leave them to be completed by private enterprise. Of the two works thus unfinished, the "Dictionary of Technical Terms" has naturally the best claim to be continued, as its subject is of more general use than the "Biogra-

phies of persons who knew Mahammed," while at the same time it is much nearer completion.

It appears that of the 1257 pages of the original MS. 717 pages have been already printed, and only 540 remain. The part already printed fills 920 pages in the Bib. Indica, but as this embraces numerous additions by the editing Maulavy, which would be discontinued in the remaining portion, it is calculated that the 540 remaining pages of the MS. would barely occupy more than the same number of printed pages. Captain Lees has undertaken to have the work edited at the cost of Rs. 3 per form of 4 pages, which would amount to say 400 Rs. for the whole. The expence of printing say 7 Fasciculi of 560 pages would be somewhat less than 3000 Rs. Thus the total cost of completing the work would be less than 3,500 Rs., and the publication would probably extend over a year and half.

Under these circumstances the Philological Committee strongly recommend to the Council that the work, should be completed. It is a Book of real value in the eyes of Oriental scholars in Europe as well as in India, and there is no hope, they find, of its being completed in any other way than by the Society's undertaking to do it. At the same time the state of the Oriental Fund amply warrants our incurring the increased expenditure.

The Report was adopted.

The Council reported 2ndly, that Mr. Theobald has been placed on the Committee of Natural History.

Communications were received.

1. From R. H. Davies, Esq., Secretary to the Government of Punjaub, forwarding copy of a letter from Major Becher, Deputy Commissioner, Huzara, at present on special duty at Cashmir, giving the result of his enquiries into the origin of the Indus Flood of August, 1858.

The Secretary remarked that this paper would be published in the forthcoming No. of the Journal, together with Captain Henderson's report, which was read on a former occasion. In the meantime he thought it would be interesting to the meeting, if he stated shortly the results at which Major Becher had arrived.

From Major Becher's report it appeared that the warning letter received at Attock had been traced to two Syuds living at *Kalingar* in Huzara.

Major Becher, confirmed from independent sources by Captain Moutgomerie, stated as the result of his enquiries that the recent flood of August, 1858, was caused by the stoppage of the river *Hoonza* about a day's journey above the Fort of that name, and 4 or 5 days northwards of Gilgit. The site of the obstruction would thus appear to be about 300 miles above Attock. "It was caused," Major Becher said, "by the subsidence of a mountain side called *Phungurh* from the action or rain and snow above, and of the stream below, in the winter of 1858."

The obstruction appeared to have continued 6 months before the accumulated waters forced a passage.

Men had been despatched by Major Becher to make personal enquiries, and if possible to see the spot, where the landslip occurred, but letters had been received from them from the borders of Kohistan and Gilgit, declaring that it was impossible to proceed further, in consequence of hostilities between the chief of *Nuggur* and those of *Hoonza* and *Gilgit*.

Major Becher thought there was no foundation for the rumour which was current, that a fresh obstruction had occurred.

Reverting to the flood of 1841, Major Becher shewed that it was occasioned by the damming up of the main stream of the Indus across which the shoulder of a mountain was precipitated by an Earthquake. This mountain was called *Ultoo Kuun*, and was situated about 5 coss south of "*Ghor*," between *Fulzcha* and the Fort of Boonjee, in the district of Astor or Hussoora.

2. From Col. J. Abbott, a few particulars regarding some ancient copper coins presented by him to the Society in June last.

3. From Messrs. Hermann and R. Schlagintweit, Official Reports on the last journey and death of Adolphe Schlagintweit in Turkistan.

4. From the Under-Secretary to the Government of India, forwarding an Itinerary with memoranda chiefly topographical and zoological through the southerly portions of the district of Amherst, Province of Tenasserim, accompanied by a map, by Major S. R. Tickell, together with copious Botanical Notes by the Rev. C. S. P. Parish, Chaplain of Moulmein.

5. From W. Theobald, Esq. Jr., Descriptions of some new

Burmese and Indian Helicidae, with remarks on some previously described species.

6. From Baboo Radahnauth Sikdar, an abstract of the Hourly meteorological observations taken at the Surveyor General's Office in the month of February last.

The Officiating Librarian submitted the usual monthly report.

Mr. J. G. Medicott read a "Note on the Geological structure of parts of Central India."

Mr. Medicott first pointed out, with the assistance of Maps, the existence of some remarkable features in the physical aspect of a band of country, which stretching in a generally E. and W. direction, across Central India, includes the valley of the Nerbudda and that of the Soane, from Mndlaisir on the former, to Rhotasgur on the latter. These are, first, the persistently rectilinear direction of two ranges of hills, one on the north of both these vallies, and the other on the south of them, and next, the close approach to parallelism maintained by these ranges throughout a length of between 500 and 600 miles.

It was then shown that each of these parallel lines is a geological boundary, and that each of these boundaries is a fault, lastly, that the movements which caused these faults, occurred with an interval of, at least, one whole geological period, between them.

Briefly analysing a theory held by many geologists, and which affirms the synchronons origin of parallel faults, and describing some of the difficulties attending the satisfactory application to facts, of this theory, Mr. Medicott concluded by showing, how, and to what extent, the example before the meeting must be considered as furnishing an exception, and as being a case in which the theory does not hold good. Believing that it was desirable to place on record instances of this nature, he at the same time deprecated the idea of hastily discrediting the theory with what may be only an apparent failure, consequent perhaps on the neglect or erroneous appreciation of some conditions having vitiated the result of otherwise careful observations and cautious inductions.

The thanks of the meeting were voted to Mr. Medicott for his able paper.



*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1859.*

Latitude 22° 33' 1" North. Longitude 88° 20' 34" East.

feet.

Height of the Cistern of the Standard Barometer above the Sea level, 18.11

Daily Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Date.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer during the day.			Mean Dry Bulb Thermometer.	Range of the Temperature during the day.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
1	29.824	29.898	29.745	0.153	79.4	89.6	71.2	18.4
2	.795	.867	.736	.131	76.9	87.6	72.3	15.3
3	.838	.893	.780	.113	72.9	80.0	68.8	11.2
4	.862	.948	.807	.141	67.2	70.0	63.4	6.6
5	.849	.922	.807	.115	67.6	73.2	63.6	9.6
6	<i>Sunday.</i>							
7	.867	.940	.808	.132	73.3	79.8	69.3	10.5
8	.855	.922	.809	.113	73.9	83.2	66.5	16.7
9	.830	.906	.762	.144	77.2	86.3	70.4	15.9
10	.810	.867	.756	.111	79.0	86.8	73.2	13.6
11	.854	.934	.791	.143	79.6	87.6	75.0	12.6
12	.886	.979	.833	.146	79.7	88.0	73.8	14.2
13	<i>Sunday.</i>							
14	.766	.851	.719	.132	79.2	87.0	74.0	13.0
15	.826	.909	.763	.146	76.9	85.4	70.6	14.8
16	.860	.952	.814	.138	76.6	86.1	68.6	17.5
17	.846	.925	.770	.155	78.6	88.6	70.4	18.2
18	.862	.935	.805	.130	80.2	91.4	72.2	19.2
19	.896	.972	.830	.142	81.3	90.4	74.2	16.2
20	<i>Sunday.</i>							
21	.958	30.041	.893	.148	82.4	90.2	76.6	13.6
22	.952	.027	.887	.140	81.3	91.0	73.6	17.4
23	.977	.069	.903	.166	80.4	90.8	74.2	16.6
24	.937	.010	.872	.138	81.6	92.0	73.6	18.4
25	.894	29.959	.817	.142	81.7	91.4	74.8	16.6
26	.891	.950	.838	.112	82.4	89.6	77.4	12.2
27	<i>Sunday.</i>							
28	.912	.992	.837	.155	84.6	93.2	79.0	14.2
29	.925	.994	.865	.129	83.5	89.6	78.6	11.0
30	.955	30.055	.867	.188	83.2	91.8	77.6	14.2
31	.991	.077	.922	.155	84.1	93.3	76.2	17.1

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the twenty-four hourly observations made during the day.



Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1859.

Daily Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

Date.	Mean Wet Bulb Thermo- meter.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic force of Vapour.	Mean Weight of Vapour in a cubic foot of Air.	Additional Weight of Va- pour required for com- plete saturation.	Mean degree of Humidity, complete saturation be- ing unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
1	72.3	7.1	68.7	10.7	.697	7.52	3.10	.71
2	73.3	3.6	71.5	5.4	.763	8.30	1.56	.84
3	69.5	3.4	67.8	5.1	.677	7.41	.32	.85
4	64.9	2.3	63.5	3.7	.588	6.50	0.85	.88
5	65.5	2.1	64.2	3.4	.601	.65	.79	.89
6	<i>Sunday.</i>							
7	69.5	3.8	67.6	5.7	.672	7.35	1.49	.83
8	69.1	4.8	66.7	7.2	.653	.13	.88	.79
9	71.2	6.0	68.2	9.0	.686	.44	2.51	.75
10	73.5	5.5	70.7	8.3	.744	8.05	.45	.77
11	73.7	5.9	70.7	8.9	.744	.03	.66	.75
12	73.4	6.3	70.2	9.5	.732	7.89	.83	.74
13	<i>Sunday.</i>							
14	71.2	8.0	67.2	12.0	.664	.17	3.39	.68
15	67.3	9.6	62.5	14.4	.568	6.17	.69	.63
16	66.2	10.4	61.0	15.6	.541	5.87	.90	.60
17	70.0	8.6	65.7	12.9	.632	6.84	.54	.66
18	71.8	8.4	67.6	12.6	.672	7.25	.63	.67
19	76.7	4.6	74.4	6.9	.838	9.02	2.22	.80
20	<i>Sunday.</i>							
21	73.0	9.4	68.3	14.1	.688	7.39	4.22	.64
22	70.0	11.3	64.3	17.0	.603	6.49	.75	.58
23	72.4	8.0	68.4	12.0	.690	7.44	3.50	.68
24	73.7	7.9	69.7	11.9	.720	.74	.60	.68
25	76.1	5.6	73.3	8.4	.809	8.70	2.67	.77
26	77.9	4.5	75.6	6.8	.871	9.35	.26	.81
27	<i>Sunday.</i>							
28	76.3	8.3	72.1	12.5	.770	8.31	4.08	.67
29	78.6	4.9	76.1	7.4	.885	9.50	2.50	.79
30	74.6	8.6	70.3	12.9	.734	7.87	4.02	.66
31	75.3	8.8	70.9	13.2	.748	8.02	.19	.66

All the Hygrometrical elements are computed by the Greenwich constants.

*Abstract of the Results of the Hourly Meteorological Observations taken at the Surveyor General's Office, Calcutta, in the month of March, 1859.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements dependent thereon.

Hour.	Mean Height of the Barometer at 32° Fahr.	Range of the Barometer for each hour during the month.			Mean Dry Bulb Thermometer.	Range of the Temperature for each hour during the month.		
		Max.	Min.	Diff.		Max.	Min.	Diff.
	Inches.	Inches.	Inches.	Inches.	o	o	o	o
Mid-night.	29.876	29.978	29.738	0.240	75.2	81.7	64.0	17.7
1	.864	.972	.731	.241	74.6	81.8	64.4	17.4
2	.852	.953	.721	.232	74.1	80.5	64.2	16.3
3	.843	.949	.719	.230	73.6	80.4	64.6	15.8
4	.845	.974	.724	.250	73.6	80.2	64.0	16.2
5	.860	.986	.744	.242	73.4	79.6	63.8	15.8
6	.874	30.017	.763	.254	73.0	79.3	63.6	15.7
7	.901	.031	.779	.252	73.2	79.7	64.0	15.7
8	.932	.055	.822	.233	75.5	81.8	65.4	16.4
9	.945	.077	.841	.236	77.9	83.4	66.0	17.4
10	.951	.071	.851	.220	80.4	85.4	66.6	18.8
11	.943	.076	.838	.238	82.7	88.0	66.2	21.8
Noon.	.921	.032	.814	.218	84.6	91.2	64.8	26.4
1	.891	29.994	.792	.202	85.9	92.4	65.4	27.0
2	.860	.966	.761	.205	86.2	92.6	67.4	25.2
3	.837	.949	.734	.215	86.3	93.3	69.8	23.5
4	.832	.929	.749	.180	85.7	93.0	69.2	23.8
5	.822	.922	.723	.199	84.2	91.6	68.6	23.0
6	.833	.926	.724	.202	81.8	88.8	65.6	23.2
7	.849	.943	.719	.224	79.7	86.7	65.0	21.7
8	.872	.983	.749	.234	78.1	84.8	64.8	20.0
9	.886	30.003	.761	.242	77.1	84.2	65.8	18.4
10	.896	.005	.775	.230	76.2	82.0	65.0	17.0
11	.893	.019	.782	.237	75.6	82.0	63.4	18.6

The Mean height of the Barometer, as likewise the Mean Dry and Wet Bulb Thermometers are derived from the observations made at the several hours during the month.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1859.*

Hourly Means, &c. of the Observations and of the Hygrometrical elements  
dependent thereon.—(Continued.)

Hour.	Mean Wet Bulb Ther- mometer.	Dry Bulb above Wet.	Computed Dew Point.	Dry Bulb above Dew Point.	Mean Elastic Force of Vapour.	Mean Weight of Va- pour in a cubic foot of Air.	Additional Weight of Vapour required for complete satu- ration.	Mean degree of Hu- midity, complete saturation being unity.
	o	o	o	o	Inches.	T. gr.	T. gr.	
Mid- night.	71.9	3.3	70.2	5.0	.0732	7.97	1.40	0.85
1	71.6	3.0	70.1	4.5	.729	.95	.25	.86
2	71.3	2.8	69.9	4.2	.725	.92	.15	.87
3	70.9	2.7	69.5	4.1	.715	.82	.11	.88
4	71.1	2.5	69.8	3.8	.722	.89	.04	.88
5	70.8	2.6	69.5	3.9	.715	.82	.05	.88
6	70.5	2.5	69.2	3.8	.708	.75	.01	.89
7	70.7	2.5	69.4	3.8	.713	.80	.02	.88
8	71.8	3.7	69.9	5.6	.725	.88	.58	.83
9	72.4	5.5	69.6	8.3	.717	.77	2.39	.77
10	73.0	7.4	69.3	11.1	.711	.66	3.28	.70
11	73.3	9.4	68.6	14.1	.695	.46	4.26	.64
Noon.	73.1	11.5	67.3	17.3	.666	.12	5.27	.58
1	73.5	12.4	67.3	18.6	.666	.09	.78	.55
2	73.2	13.0	66.7	19.5	.653	6.94	6.05	.53
3	72.9	13.4	66.2	20.1	.642	.84	.18	.53
4	73.1	12.6	66.8	18.9	.655	.98	5.82	.55
5	72.7	11.5	66.9	17.3	.657	7.03	.21	.57
6	72.6	9.2	68.0	13.8	.681	.32	4.08	.64
7	72.6	7.1	69.0	10.7	.704	.59	3.13	.71
8	72.2	5.9	69.2	8.9	.708	.67	2.55	.75
9	71.9	5.2	69.3	7.8	.711	.70	.22	.78
10	71.6	4.6	69.3	6.9	.711	.72	1.94	.80
11	71.5	4.1	69.4	6.2	.713	.77	.71	.82

All the Hygrometrical elements are computed by the Greenwich constants.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1859.*

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	General Aspect of the Sky.
	o	Inches.		
1	137.0	..	S. & W.	Cloudless till 7 A. M. Scatd. $\searrow$ i till 1 P. M. cloudy till 7 P. M. cloudless afterwards.
2	129.0	1.46	S. E. & S.	Cloudless till 4 A. M. cloudy afterwards; also raining at 2 and 3 and 6 and 7 P. M.
3	..	..	N. E. & E.	Cloudy the whole day; also thundering and lightning between Midnight and 2 A. M.; also drizzling at 1 A. M. and 7 and 8 P. M.
4	..	1.80	N. E. & E.	Cloudy the whole day; also thundering and lightning at 11 A. M. and constantly raining.
5	..	0.97	N. E. & E.	Cloudy the whole day; also constantly raining; also thundering and lightning between 5 and 8 P. M.
6	<i>Sunday.</i>			
7	..	..	S. E.	Cloudy till 7 P. M. cloudless afterwards, also slightly drizzling between 1 and 2 P. M.
8	143.0	..	S. E. & S. W.	Cloudless till 11 A. M. Scatd. $\circ$ i till 4 P. M. cloudless afterwards; also foggy between 6 and 7 A. M.
9	140.2	..	S. & S. W.	Cloudless till Noon. Scatd. $\circ$ i till 3 P. M. cloudless afterwards, also foggy between 4 and 7 A. M.
10	131.0	..	S. & N. W. & W.	Cloudless till 6 A. M. Scatd. $\searrow$ i and $\searrow$ i till 3 P. M. cloudless afterwards.
11	135.0	..	S. W. & S.	Cloudy till 7 A. M. Scatd. $\searrow$ i till 11 A. M. Scatd. $\circ$ i till 7 P. M. cloudless afterwards; also very slightly drizzling at 1 A. M.
12	139.4	..	S. & S. W.	Cloudless till 5 A. M. Scatd. $\circ$ i or $\searrow$ i till 11 A. M. cloudless afterwards.
13	<i>Sunday.</i>			
14	133.2	..	W. & S.	Cloudless.
15	132.0	..	W.	Cloudless.
16	138.0	..	S. & W. & S. W.	Cloudless.
17	136.0	..	S. & S. W.	Cloudless.
18	139.0	..	S. & S. W.	Cloudless till 11 A. M. Scatd. $\searrow$ i till 3 P. M. Scatd. $\searrow$ i till 6 P. M. cloudless afterwards.

$\searrow$ i Cirri,  $\searrow$ i Cirro strati,  $\circ$ i Cumuli,  $\sim$ i Cumulo strati,  $\searrow$ i Nimbi,  $\text{—}$ i Strati,  $\searrow$ i Cirro cumuli.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1859.*

Solar Radiation, Weather, &c.

Date.	Max. Solar radiation.	Rain Gauge 5 feet above Ground.	Prevailing direction of the Wind.	General Aspect of the Sky.
	o	Inches.		
19	130.8	..	S.	Cloudless.
20	<i>Sunday.</i>			[cloudless afterwards.
21	139.9	..	S. W. & W.	Cloudless till 2 A. M. cloudy till 7 A. M.
22	144.0	..	N. W. & W.	Cloudless.
23	131.0	..	S. & S. E.	Cloudless.
24	137.2	..	S. & S. W.	Cloudless.
25	136.0	..	S.	Scatd. \i till 7 A. M. cloudless afterwards.
26	130.0	..	S.	Scatd. clouds.
27	<i>Sunday.</i>			
28	136.0	..	S. & N. E.	Scatd. \i till 9 A. M. Scatd. \i till 7 P. M. cloudless afterwards.
29	..	..	S.	Cloudless till 3 A. M. Scatd. clouds till 9 P. M. cloudless afterwards.
30	134.0	..	S.	Cloudless till 4 A. M. cloudy till 11 A. M. cloudless afterwards.
31	134.9	..	E. & S.	Cloudless till 5 A. M. Scatd. \i and \i till 8 P. M. cloudless afterwards.

*Abstract of the Results of the Hourly Meteorological Observations  
taken at the Surveyor General's Office, Calcutta,  
in the month of March, 1859.*

MONTHLY RESULTS.

			Inches.
Mean height of the Barometer for the month,	..	..	29.878
Max. height of the Barometer occurred at 9 A. M. on the 31st,	..	..	30.077
Min. height of the Barometer occurred at 3 A. M. and 7 P. M. on the 14th,	..	..	29.719
<i>Extreme range</i> of the Barometer during the month,	..	..	0.358
Mean of the daily Max. Pressures,	..	..	29.955
Ditto ditto Min. ditto,	..	..	29.816
<i>Mean daily range</i> of the Barometer during the month,	..	..	0.139

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			o
Mean Dry Bulb Thermometer for the month,	..	..	78.7
Max. Temperature occurred at 3 P. M. on the 31st,	..	..	93.3
Min. Temperature occurred at 11 P. M. on the 4th,	..	..	63.4
<i>Extreme range</i> of the Temperature during the month,	..	..	29.9
Mean of the daily Max. Temperature,	..	..	87.2
Ditto ditto Min. ditto,	..	..	72.6
<i>Mean daily range</i> of the Temperature during the month,	..	..	14.6

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			o
Mean Wet Bulb Thermometer for the month,	..	..	72.1
Mean Dry Bulb Thermometer above Mean Wet Bulb Thermometer, ..	..	..	6.6
Computed Mean Dew-point for the month, ..	..	..	68.8
Mean Dry Bulb Thermometer above computed mean Dew-point, ..	..	..	9.9
			Inches
Mean Elastic force of Vapour for the month,	..	..	0.699

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			Troy grains.
Mean Weight of Vapour for the month, ..	..	..	7.56
Additional Weight of Vapour required for complete saturation, ..	..	..	2.85
Mean degree of humidity for the month, complete saturation being unity,	..	..	0.73

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			Inches.
Rained 6 days, Max. fall of rain during 24 hours, ..	..	..	1.80
Total amount of rain during the month, ..	..	..	4.23
Prevailing direction of the Wind, ..	..	..	S. & S. W. & W.







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